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# USSR Report

## MILITARY AFFAIRS

## AVIATION AND COSMONAUTICS

No 11, November 1985



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Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

## CONTENTS

PILOTS HAVING PROBLEMS MASTERING NEW AIRCRAFT REACHING LINE UNIT

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) PP 1-3

[Article by Col Gen Avn L. Batekhin, Military Council member, chief of the Air Forces Political Directorate: "Decisive Factor of the Contemporary Era"]

[Text] Our mighty socialist state has been successfully developing and growing stronger for 68 years now. In honoring this important date, Soviet citizens and Armed Forces personnel acknowledge even more forcefully the magnificence of the role of the Communist Party -- organizer of and inspiring force behind all our victories -- a party which was created by V. I. Lenin and which led the people to victory in the October Revolution.

To V. I. Lenin goes the great credit for formulating a military program of the proletarian revolution, teaching on defense of the socialist homeland, and for establishing the army of the world's first worker and peasant state. The present-day might of the Soviet Union and its Armed Forces persuasively demonstrates the validity of our leader's brilliant teaching.

Today, in the final year of the 11th Five-Year Plan, on the eve of the 27th CPSU Congress, the life, affairs and thoughts of the Soviet people are illuminated by the inspiration of creative, constructive labor. Soviet fighting men, including military aviation personnel, are faithfully carrying out this duty to protect the socialist homeland.

Each and every Communist Party congress is an important historical stage along the party's path of advance, an event of enormous political significance. CPSU Central Committee General Secretary Comrade M. S. Gorbachev emphasized that the forthcoming highest forum of this country's Communists will without question become another milestone in our country's development. This idea was clearly and strongly reaffirmed in the decisions of the October (1985) CPSU Central Committee Plenum, which ratified a new draft version of the Program of the Communist Party of the Soviet Union, draft revisions to the CPSU Rules and the draft Basic Directions of Economic and Social Development of the USSR for the Period 1986-1990 and up to the Year 2000. Discussion of these documents in party and public organizations and by workforces gives special resonance to all pre-congress work.

Preparations to greet the 27th CPSU Congress in a worthy fashion are taking place at a time when the aggressive forces of imperialism have been showing increased activeness in the international arena. It was stated at the April (1985) CPSU Central Committee Plenum that, in spite of peace initiatives by the USSR and the other socialist countries, in recent years imperialism has stepped up its subversive activities and is coordinating its actions against the socialist states. This extends to all domains -- political, economic, ideological, and military. Military aviation personnel are well aware of the potentially explosive nature of the international situation and the increased role of the time factor in efforts to achieve military strategic parity, and are aware in a practical manner of the party's concern to ensure that we have the means of responding to aggressive intrigues by the enemies of peace.

Today one of the main, specific facets of the constitutional duty of all those who have chosen defense of the homeland as their professional career lies in rapidly and fully mastering the maximum capabilities of modern weapons and equipment. This is why the constructive ideas and guidelines of the April (1985) CPSU Central Committee Plenum on ways to speed up scientific and technological advance and the tasks of Air Forces command and political cadres, party and Komsomol organizations which proceed from this are being discussed at party report and election meetings as the main directional thrust of all technical policy, combat training and indoctrination work.

Analyzing the course of progress of reports and elections in party organizations, one cannot help but become convinced of the fact that those who present reports and those who speak in the debates are unfailingly devoting attention to the party's policy line directed toward activating the human factor and achieving a situation whereby each individual will work conscientiously at his own job with a full return on effort. Communists in the Air Forces see this as a primary reserve potential for achieving improvement in all areas. Get-togethers with personnel at airfields, at weapons readying stations, at scientific research establishments and at military educational institutions reveal even more incisively the multifaceted nature and complexity of the problems which are encompassed by the term "human factor," a concept which appears simple at first glance.

The following statement by CPSU Central Committee General Secretary Comrade M. S. Gorbachev fully applies to the process of mastering complex hardware, which is an important form of technical upgrading of the Air Forces: "This task, of considerable scope and extent, makes necessary profound changes in party work. This work deals with a decisive factor in all changes -- the human factor. Hence a main current party guideline -- to accomplish a breakthrough, employing all measures, in the mind and attitudes of cadres from top to bottom...."

There are many commanders and political workers in the Air Forces who change in an innovative and prompt manner their approaches to things immediately following change in the objective conditions of employment and operation of new equipment. There are many valuable and instructive elements in this attitude, such as in the work of the political section of the unit in which officer V. Vasin serves. The strength and influence of this political agency lie first and foremost in lively, informal communications with the men,

thorough knowledge of their concerns and problems, in the ability to determine the main element, in precise work planning, and in correct selection of main points of application of manpower and resources. The political section officers do not merely appeal to reorganize party work methods. Well aware of the demands which modern hardware imposes on the pilot, navigator, engineer and technician, they endeavor to make the men clearly aware of and respond to these demands in a prompt and timely manner.

But there are also other examples, where development of the human factor is lagging behind the hardware and is impeding attainment of its maximum potential. This is why a discussion on this topic is of such crucial importance.

As we know, each new generation of aviation equipment imposes specific demands and requirements on the mode of its combat employment, operation and maintenance, and on the military aviator. Most typical in this regard is the process of mastering operation of modern fixed-wing and rotary-wing aircraft. They have brought us automated control systems, aiming and navigation systems with onboard digital computer, and guided weapons. These distinctive traits and features of this modern hardware have made it possible to raise to an even higher level aircraft performance characteristics and combat capabilities and have enabled us to add new content to such concepts as "faktor vremeni" [time factor], "manevr" [maneuver], "dosyagayemost" [range], and "rezultativnost ognevogo vozdeystviya" [lethality of fire].

The most complex moral-psychological and professional-methodolgoical problems are resolved at this stage. A new element has become organically incorporated into the man-aircraft system -- "program". This has unquestionably brought considerable distinctiveness to the psychology of flying labor. The role of the pilot's immediate and abstract thinking, anticipatory reaction, attention, his intellectual and creative potential has grown immeasurably. Today he not only flies the aircraft but also models and programs his flight with other specialists. The nature of flying labor has assumed a stronger research and innovative character. And one must work more thoughtfully and on a rigorously individual basis with pilots today, with an understanding of the uniqueness of each flight, taking into account the level of proficiency and character of each combat aviator.

Today air combat results depend to a considerable degree on aviation engineer service specialist personnel. Computerization, alignment and adjustment of aiming and navigation systems, evaluation of equipment based on its actual state and condition, adoption of advanced monitoring, testing and diagnostic methods, as well as many other new things in aircraft servicing and maintenance have radically transformed the labor of the aviation maintenance specialist. A number of new aviation engineering occupational specialties have appeared.

The importance of responsibility and honesty on the part of aviation engineer service specialist personnel has increased to an even greater degree. For example, the aircraft technician today plays a much more important role as a unique final stage of inspection through which pilot and aircraft go prior to departing on a training sortie. The technician helps the pilot climb into the

cockpit and prepare to taxi to the active. He is the sole individual who sees the pilot in the cockpit just prior to departure. And the success of a mission depends in large measure on how experienced and sensitive he is, how well he is able to perceive the condition and state of the pilot, how exacting he is in assessing danger signs. In short, we must continue to strengthen the friendship between flight and technical personnel, the solidity of the crew -- this primary component of military aviation. This is a fine Air Forces tradition, born in the crucible of the Great Patriotic War. Its succession is very important in working to master today's hardware.

Also requiring a new approach is party-political work with personnel of combat command and control agencies, electronic and specialized flight operations support services and, of course, with those who plan, schedule and organize flight operations.

Unfortunately not all of our command and political cadres are as yet reorganizing their activities in a sufficiently prompt, timely and complete manner. For example, some of the commanders and political workers in the unit the political section in which is headed by officer A. Vozov did a great deal to mobilize the pilots of one of the squadrons to master rapidly and in a high-quality manner the techniques of flying a new aircraft. But subsequently they were slow about bringing the human factor into conformity with succeeding tasks pertaining to mastering the highly complex system. When the men proceeded with the main task -- mastering what for them were new methods of combat employment and new tactics, political-indoctrination work proceeded to slacken and began to be distinguished by a monotony of forms. Efficiency innovation work became less active, and dissemination of technical knowledge continued to be conducted in the old way. The command authorities and political section changed little in the methods of their activities pertaining to organizing flight operations and tactical air exercises and failed to intensify the campaign against unnecessary situation simplification and lack of organization. Some administrative echelons, working according to obsolete patterns, did a poor job of adjusting to new organization of equipment servicing and maintenance.

The situation in the collective is improving at the present time. But its miscues should serve as a warning to others. This fact shows that increasing emphasis on the human factor in the process of mastering new equipment is being impeded by a lag in the level of competence of a certain portion of command-political personnel in the area of human psychology, in theory, methodology, and especially in the practice of party-political work, aviation psychology and military education science. Sometimes certain individuals inadequately thoroughly study the specific features of complex aircraft systems. One encounters instances where party demandingness on political personnel slackens as regards quality of job proficiency and independent work, as well as observance of the fundamental principle "the immediate superior teaches his subordinate." This is what happened to officer V. Lakhno. Although a well-trained and experienced worker, he put out insufficiently persistent effort to improve the training of the political workers of the subunits and accepted the fact that they were performing job duties not in keeping with their actual jobs, the fact that their time was frequently taken up by housekeeping-type activities to the detriment of indoctrination of the

men, and the fact that they were duplicating activities of the administrative services. This was of course an abnormal situation, and it had to be corrected.

The most effective aspect of more actively applying the human factor is the ability of the commander and political agency to implement in a timely manner the creative initiative of the men and to guide their will and mindset toward victory. Many aviation collectives have amassed considerable experience in mobilizing the men's productive potential. I shall cite the following example. Extensive adoption of efficiency innovation proposals submitted by aviation personnel of the units in which party work is headed by officers N. Shirshnev and V. Minin has made it possible to make almost 30 percent tougher the target accuracy criteria on one type of missile, with a considerable reduction in readying time. In these same units implementation of another valuable technical improvement resulted in reducing landing minimums. Large quantities of fuel are being saved in the Air Forces each year due to optimizing aircraft engine operating conditions and improving organization of flight operations.

Nevertheless the scale and effectiveness of this work are not sufficient to allow full implementation of the innovative potential on the part of personnel. What is of concern to us in this area? As already noted, in some units inadequate attention is devoted to development of the men's initiative. Sometimes commanders and political workers do not help accomplish the adoption of specific useful suggestions. Some places dissemination of advanced know-how has lost its essential meaningfulness. Naturally all this does not promote full implementation of the human factor. In short, as was emphasized at the April (1985) CPSU Central Committee Plenum, our command and political cadres should be accomplishing the present stage's complex tasks of considerable scope in a serious manner, relying on the keen innovativeness of personnel, their intelligence, talent, and inspired labor.

As we know, the foundation of an officer's knowledge and skills as an indoctrinator and educator is laid down at service school, at the service academy, and is augmented and refreshed in various training courses, at training conferences, and at training centers. Evening universities of Marxism-Leninism also make a contribution to this process. This system organizationally ensures in the Air Forces continuous improvement of officers' psychological-pedagogic and political-indoctrination skills throughout their entire service. But the quality of this process frequently leaves something to be desired. As performance evaluation has shown, the teaching of party-political work, education science and psychology in the departments headed by officers A. Yanovskiy, V. Govyuk and certain others was being conducted in a manner lagging behind the pace of development of the Air Forces and was poorly reflecting the moral-psychological aspects of mastery of new equipment and advanced know-how in indoctrinating personnel amassed in line units. In some places they insufficiently take into consideration the specific training specialization of specialist personnel. This results in difficulty in accomplishing their main task -- developing in enrolled personnel a taste for party-political work, for gaining knowledge of a person's inner soul and revealing his creative possibilities.

The level of scientific substantiation of newly-arising moral-psychological, physiological and other problems should be raised in order to acomplish more successful mastery of modern aircraft equipment. Unit commanders and political workers will do a better job of resolving these problems with higher-quality, more prompt and timely assistance on the part of scientific research establishments, military educational institutions, and training centers.

Recently a great deal has been accomplished in this regard. For example, methods aids have been developed for stepping up innovation activities and increasing the responsibility of personnel for mastering new equipment. Good experience has been amassed in uniting the efforts of social scientists and specialists in the exact sciences for joint elaboration of the psychological aspects of efficient operation of complex automated control systems. But flying labor and the interests of strengthening defense capability demand more.

It was noted at a conference at the CPSU Central Committee on matters pertaining to accelerating scientific and technological advance that higher educational institution science constitutes an important reserve potential which is not yet being fully utilized. In connection with this, political agencies and party organizations of higher educational institutions and scientific establishments should get closer to the research aspect of the activities of their party members and work more persistently to stimulate their activities pertaining to giving methods assistance to regiments working on mastering complex aircraft. It is necessary effectively to utilize the scientific potential of higher educational institutions in order to ensure that the content and methods of party-political work in the units and subunits do not lag behind the advance of technology and tactics.

It is necessary to increase the effectiveness of monitoring the practical utilization of the useful conclusions of scientific research projects in the intellectual domain. Their implementation does not take place automatically. Also required here is party support, and sometimes a firm campaign as well against bureaucrats and conservatives, who are disinclined to abandon their accustomed rut and to readjust taking into account the latest advances in psychology, education and military science.

In solving the problem of the human factor, it is very important to bring into conformity with the new specific features of flying activity the mechanism of interaction between political workers and medical personnel, to add new content to the work done by women's councils and other public organizations, to reorganize the system of measures directed toward maintaining a healthy work and rest regimen, to teach every combat pilot to maintain a long flying career, and thoroughly to analyze one's mental and psychological activity in altered flying conditions. Every pilot is familiar with the following statement by M. Gromov: "One cannot learn to control an aircraft properly without having learned to control oneself." This statement is as valid today as ever before.

In connection with this there has been a sharp increase in the significance of the individual approach in determining the schedule of training classes,

psychophysiological practice sessions, combined drills, dual instruction and check rides. In the past aircraft were to some degree forgiving of certain standardization and leveling of such schedules, but today a search for universal formulas and a single panacea for all ills is absolutely intolerable. Party-political work with flight and technical personnel must be improved and individualized now, immediately. For this reason the role of the squadron deputy commander for political affairs is becoming particularly important today. Candidates for this position must be selected in advance, and a better job must be done with preparing them, forging out of them perhaps not engineers but, I would say, designers of men's souls.

Finally, stricter demands must be placed on organization of flight operations, increasing the responsibility of party members on headquarter staffs as well as of other command and control agencies for strict observance of the rules and regulations governing flying service. Aviation personnel must be taught to value each and every minute on the job, effectively and efficiently to utilize each and every flight, each and every training activity. All these are important facets of intensifying the human factor at the present stage of mastering complex aircraft.

The political enthusiasm evoked by preparations for the 27th CPSU Congress has swept all categories of Air Forces personnel. In order to guide it into a channel of practical actions, commanders, headquarter staffs, and political agencies must skillfully place all organizational and technical reforms on an ideological foundation of conviction, implementing as fully as possible the human factor -- one of our main reserve potentials and principal advantages over the potential adversary. Herein lies a guarantee of continued effective increase in the combat readiness of Air Forces units and subunits, which are standing vigilant guard over the achievements of the Great October Revolution.



3024
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IMPORTANCE OF CONSCIENTIOUS PILOT PRE-MISSION PREPARATION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) p 4

[Article, published under the heading "Be Alert, In a Continuous State of Combat Readiness," by Military Pilot 1st Class Capt N. Belov: "Profiting From the Experience of the Best"]

[Text] Our squadron's aviators are working selflessly to accomplish assigned tasks. Convincing confirmation of this is the excellent combat training performance results accomplished for the summer period of training.

This success is quite logical. Preparing to greet in a worthy manner the 27th CPSU Congress and implementing the party's demands pertaining to strengthening this country's defense capability, subunit personnel are endeavoring to increase their flying and technical proficiency and are learning to utilize in an effective manner the equipment entrusted to them, in conditions of modern-day air-to-air combat.

Military pilots officers V. Gapchinskiy, M. Fadeyev, and A. Khon, aviation engineer service specialists Sr Lts M. Kremeshnyy, O. Ponomarenko, and others are marching confidently on the right flank of socialist competition. These comrades are accomplishing all tasks with exclusively excellent quality. Realizing that modern combat makes special demands of combat pilots and does not forgive mistakes or unnecessary situation simplication, pilots are endeavoring to destroy their mock adversary with the first missile on the first pass.

It is no simple matter to become a skilled combat pilot, an expert at marksmanlike attacks. Aviators are well aware of this fact. We therefore devote serious attention to deepening our knowledge of theory and improving skills in combat employment of aircraft and armament. The majority of scheduled training sorties take place in an environment maximally approaching actual combat. Such was the case at a recent tactical air exercise.

...Combat jets were taking off and swiftly climbing into the morning sky, covered by a bluish-gray haze. One of them was being flown by Military Pilot 1st Class Maj M. Fadeyev. Immediately after takeoff the aircraft plunged into heavy cloud cover. The pilot concentrated his attention. His training

mission involved hitting a small "enemy" target. It was no simple matter to accomplish this mission. It required solid skills, precise calculation, and the ability to utilize fully and in a tactically knowledgeable manner the capabilities of his aircraft's weapons. Major Fadeyev, possessing these qualities in full, accomplished the mission with certitude. He hit the target with his first missile.

The pilot's excellent moral-psychological and volitional fitness, his preparedness for any and all unexpected things connected with "enemy" countermeasures, and his ability instantly to evaluate a situation and quickly to make a correct decision helped him successfully to accomplish the mission. All this is grounded on thorough knowledge of the aircraft entrusted to his care and his ability to extract the maximum from it.

Military Pilot 1st Class Maj V. Gapchinskiy flies in all weather and always performs with equal precision. And how could it be otherwise, for this combat pilot is thoroughly familiar with his complex aircraft system, hence his confidence in flying and operating it. In addition, this aviator's military-technical proficiency supplements his tactical proficiency, as it were. Thoroughly familiar, for example, with the performance characteristics of his own combat aircraft and those of the "enemy," their maneuver and fire capabilities, Maj V. Gapchinskiy skillfully selects mock air-to-air combat variations which enable him to utilize precisely the maximum capabilities of his aircraft and weapons.

One would think that there was no need to argue the point that knowledge of the aircraft entrusted to one's care and effective utilization of its capabilities is the basis of successful accomplishment of any tactical problem. We are forced to admit, however, that not all aviators show an equal degree of responsibility toward improving their skills. I shall cite the following example.

Once we were preparing for aerial missile gunnery practice. Most of the pilots were working conscientiously, aware of the great complexity of the forthcoming training task. Only Capt S. Alekseyevich neglected pre-mission preparations. He decided not to bother, and assured his comrades: "I don't need any practice drilling. My missiles will hit the target anyway."

But exactly the opposite happened on Alekseyevich's training sortie. This officer performed unskillfully and unimaginatively. Later, explaining away his poor performance, he claimed that one of his instruments was malfunctioning. It was ascertained, however, that the equipment had not been a factor. Excessive self-confidence and unupgraded knowledge proved this pilot's undoing.

A pilot's combat confidence.... It is generated by solid flying skills, experience in operating in difficult conditions, and thorough knowledge of theory. It is not surprising that in our squadron we devote considerable attention to the military-technical training of our combat pilots. It is organized in the course of daily combat training, live-fire activities, and exercises. Also important is close cooperation with the regiment's specialization-area engineers, squadron deputy commanders for aviation

engineer service, flight technical maintenance unit and group chiefs. It enriches both parties with experience and makes it possible, for example, to give answers to the following tactical-technical questions: what flight configurations are most advantageous in a given tactical environment, and what weapons employment modes are more advisable?

An innovative atmosphere in the collective and a striving toward constant improvement of professional skills evokes in aviation personnel interest in the experience and know-how of their comrades. The pilots have adopted the following regular practice: upon returning from a training mission, they share their conclusions about the flight and relate their actions which ensured high-quality accomplishment of the mission. This makes it possible rapidly to disseminate the experience and know-how of the vanguard performers, making it accessible to everybody, which in turn has a salutary effect on improving the subunit's combat readiness.



3024
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AIR COMMANDERS, STAFFS IMPROVE BATTLE PLANNING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 5-6

[Article, published under the heading "Recommendations of Science Into Practical Training and Instruction," by Candidate of Military Sciences Col V. Karyakin: "Foreseeing a Combat Situation"]

[Text] The situation at the exercise for the troops of the Transcaucasus Military District, code-named "Kavkaz-85" [Caucasus-85], was becoming increasingly complex with each passing hour. A battle for a mountain pass was the culminating event of the day. After a flanking detachment of the "Western" force captured an assault force landing site, the aviation subunit in which Military Pilot 1st Class Lt Col A. Kuchkov serves was assigned the mission to provide air support to the motorized riflemen.

The aviation commander thoroughly studied the situation and received reports from his staff officers. The mountain terrain conditions prevented extensive maneuver of forces. Having assessed the development of events, the commander realized that the "adversary," endeavoring to push the motorized riflemen from their seized toehold as rapidly as possible, would move his troops up by the shortest route, using the road network. An interesting plan took shape, according to which the "battle" proceeded. "Eastern force" subunits entered the trap set for them, and "Western Force" aircraft hit them with accurate bomb and rocket strikes.

But this success did not lull the vigilance of the aviation commander. On the contrary, aware of the importance the "adversary" attached to this mountain pass and continuously evaluating the development of events and analyzing incoming intelligence, he made a decision, which took a great many people by surprise, to put a group of aircraft into the air. The moment was chosen with precision. They immediately received a report that Eastern Force aircraft had appeared over the area of operations. The pilots, led by Lt Col A. Kuchkov, expertly executed the assigned mission to intercept the "enemy" aircraft. The motorized riflemen also performed with success. The Western force succeeded in consolidating in a tactically important area. The "adversary" was driven back to the Kura.

What fostered the aircrews' success in this mock battle? I believe that an important factor was the commander's foresight, grounded on personal experience, profound knowledge of the capabilities of the equipment and weapons of the opposing sides, and preliminary calculations. This made it possible to predetermine the course of the battle and ultimately to win it.

The ability to foresee the development of events in combat, mentally to examine all features of the air and ground situation, to make decisions taking these factors into account, and to be prepared for any and all surprises is a most important indicator of a commander's professional maturity. When formulating his battle plan, he endeavors to foresee the dynamics of battle development, to look several moves ahead, as they say. It is difficult to achieve success without this. The correctness of this conclusion was demonstrated in the battles of the Great Patriotic War.

Army Gen P. Batov made quite valid comments about foresight in his book "V pokhodakh i boyakh" [In Campaigns and Battles]: "Just like any artifact of men's hands and will, a battle is fought twice -- first in one's mind, and subsequently in actuality. While the chief of staff is the mathematician of an operation, this is not enough for the commander. He should go through this first, mental battle by his power of imagination, using his sense of foresight to the acutest degree; the details of this mental battle sometimes become imprinted in his memory like frames of photographic film."

One still encounters commanders, however, who have a skeptical attitude toward the possibilities of foresight in combat. "With the development of new weaponry, countermeasures techniques and modes," they reason, "battle has become fast-moving, the situation changes swiftly and unexpectedly, and consequently nothing can be foreseen."

I cannot agree with this. It is true that today, when time is acutely of the essence, when intelligence is sometimes contradictory, the situation changes rapidly and one is unable to foresee literally everything in organizing for combat operations. This increases the importance of foresight. The dynamics of today's air combat compels a commander to be prepared for the unexpected, quickly to assess a situation and to make prompt and sound decisions, and to adjust decisions without delay when necessary. Of decisive significance thereby is a scientific analysis of the situation, grounded on knowledge of the laws of warfare and utilization of mathematical methods which enable one to perform calculations and to computer-simulate combat operations. While in the past situation prediction was of a purely empirical nature and was based chiefly on the commander's personal experience and intelligence at his disposal, today, in conditions of a continuing revolution in military affairs, these methods no longer suffice.

USSR Minister of Defense MSU S. L. Sokolov, candidate member of the CPSU Central Committee Politburo, states: "Considering the demands of today's combat, all other things being equal, greater success is achieved by that commander who has the ability to get his bearings in a situation quickly and accurately, whose operational-tactical predictions are more accurate and farsighted, and whose plans are more realistic; he who is capable of vigorously executing maneuver with the troops under his command, who possesses

better knowledge of the opponent, his weak and strong points, who more rapidly communicates his decision to his men and ensures its execution. In other words, he who does a better job of troop command and control."

Excellent training in theory and a wealth of practical experience in operating in the complex conditions of modern air combat are required of a commander for precise scientific foresight. Operational-tactical calculations play an important role in successful accomplishment of this. For example, with a computer one can achieve excellent results in computing data to estimate the combat capabilities of air forces, the quantitative-qualitative correlation of manpower and equipment possessed by the air force groupings of the opposing sides by sectors and missions, planning and estimating effectiveness of delivery of fire on the adversary's force groupings, repelling enemy attacks, execution of maneuver and redeployments of aviation units, as well as combat support. These calculations can be performed using tables, graphs, nomograms, as well as various computer hardware.

In performing calculations it is essential to proceed from the capabilities of available technical means, reliable methods, problems, and mathematical models. Some calculations can be performed on microcomputers using specially devised methods. One can obtain reliable results after a small number of computations. When employing them as input data, alongside operational-tactical information one must take synthesized indices of the combat and technical capabilities of the manpower and resources of the opposing sides, calculated on large computers using complex mathematical models.

Employment of computation problems and methods at headquarters opens up the possibility of more objective forecasting of the course of air combat operations and makes it possible to "run through" a future battle in the language of mathematics, as it were, to evaluate different variations and select in a well-substantiated manner that variation which matches the existing situation to the greatest degree.

Of course practical utilization of computation results for situation forecasting, substantiating a commander's decision and planning troop combat operations at headquarters presents certain difficulties. They are caused primarily by the complexity of combined utilization of methods of forecasting and decision substantiation by staff officers and commander in their work. Experience in field exercises indicates that in order to improve the operational efficiency and quality of the commander's decisions, it is necessary to integrate methods of forecasting, substantiation of decisions, and planning of air combat activities into a single information-computation package. This will enable the commander and his staff to use the same operational situation data and use a single system of indices characterizing the opposing forces.

The aggregate combat potential of an aviation force grouping is one such indicator. It is expressed by the following relation:

$$P = \sum_{i=1}^{n} N_i F_i,$$

where P is the force's aggregate combat potential; n -- number of types of weaponry in the force; Ni -- number of weapons of type i; Fi -- coefficient of combat potential of weapons of type i.

A similar formula can also be written for the opposing aviation force:

$$Q = \sum_{j=1}^{m} M_j K_j,$$

where Q, m, Mj, and Kj correspond to values P, n, Ni, and Fi.

On the basis of these relations one can derive an indicator of the correlation of forces of opposing aviation forces in a specified sector: C=P/Q.

It expresses the ratio of combat potentials of the opposing aviation forces, proceeding from the quantitative composition of the combat aircraft inventory by air components and their quality, determined by the combat potential coefficient.

In addition to correlation of forces, it is useful to employ the combat capability indices of the opposing aviation forces pertaining to rocket/missile and bomb salvos, the potential daily sortie rate, etc.

The commander and his staff officers must use these indices to track the status of the enemy force and to estimate change in the correlation of forces as the situation develops.

Analysis of change in aviation force indices on a space-time plot is the basis of the forecast of the operational situation in the area of operations. For example, change in the percentage relationship of strike, fighter, and army aviation and its distribution throughout the airfield network can tell us a great deal about the adversary's intentions and the degree of his aggressiveness in preparing for the conduct of combat operations.

The degree of aggressiveness of an enemy force is an important integral index with the aid of which one can predict the onset of such a critical moment in situation development as the adversary's readiness to conduct combat operations.

For example, if in any sector the total number of enemy strike aircraft increases in conformity with the graph shown in Figure 1 and the correlation of air forces of the opposing sides changes as is shown in Figure 2, in order to determine change in the activity index it suffices to differentiate on a time axis the relation depicted in Figure 1. The resulting curve (Figure 3) shows change in activity of the enemy aviation force on a time axis. One can identify on this curve a region of maximum activity, centered at moment in time t-kp. This is followed by decline in force activity against the background of a strike aviation correlation of forces which has shifted in the enemy's favor. Mathematically this is expressed in general form by the following relation:

$$C = \frac{P}{Q}.$$

On the basis of this comparatively simple analysis one can conclude that the enemy has essentially completed establishment of his strike force and soon will be ready to conduct aggressive offensive operations.

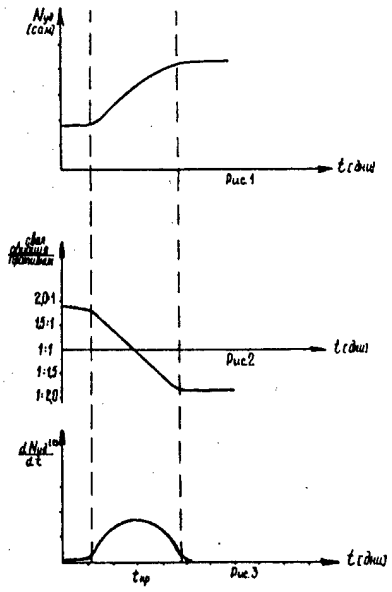

Figure 1. Change in number of strike aircraft.

Figure 2. Correlation of opposing aviation forces, strike aircraft in the sector in question.

Figure 3. Change in enemy force activity index, buildup of strike air forces.

Utilizing this method, a commander can also obtain an answer to other questions of interest and can predict the onset of important events. Its reliability is determined by the fact that peaks in enemy activity always precede the advent of turning-point moments in situation development and frequently attest to completion of the phase of preparation for combat operations, unless they are "blurred" by operational camouflage, concealment, deception, and disinformation activities. Acquisition of reliable intelligence on the status of and changes in the enemy force and analysis of this information in order to determine phony intelligence data can tell us a great deal about the enemy's intentions and the nature of his future activities.

The complex nature of estimating and forecasting the situation in a tactical area of operations requires that the commander and his staff analyze all factors affecting performance of assigned missions by the troops involved. Therefore in formulating plans, even with utilization of the results of computations and simulation, an innovative and comprehensive situation analysis will be required, grounded on the commander's experience, logic, and intuition. Only a combination of human intellect and machine computing power provides the capability to come up with the most reasonable solution, optimally corresponding to the current situation.

The uniqueness and complexity of a combat environment also excludes the possibility of employing permanent schemes of combat employment of men and equipment. And those aviation units which are eradicating unnecessary relaxation of demands and excessive situation simplification at exercises, which are striving to achieve high quality of the training process, and in which improvement of officer professional training is grounded on an organic combination of tactical training with utilization of precise calculations of the combat capabilities of friendly and enemy weapons and equipment, are proceeding correctly.

We might cite as an example the unit in which officer A. Petrov serves. They are constantly searching for effective forms and methods of training aircrews and staff officers which are in conformity with today's demands, they have well-equipped training facilities, and simulator equipment is used with maximum effect. Training exercises for officers and brief tactical drills are conducted in an atmosphere of competition. The commander and staff officers work hard to ensure that each training drill is conducted without unnecessary situation simplifications, in a dynamic and instructive manner.

At the initiative of officer A. Petrov, the principal events of a forthcoming exercise in a unit began to be simulated and rehearsed on a close to real-time basis. This made it possible most fully to reflect the dynamics of combat and to make a forecast reliable. The officers in charge of training classes and drills prepare in advance a scenario of actions to be taken by the opposing forces in various conditions and pack the battle environment with complex situations which may be encountered in actual combat. Such an arrangement of training drills helps subunit commanders acquire the skills of rapid analysis of situation development, prediction of the "adversary's moves, and utilization of computation results, which exerts direct influence on increase in aircrew combat proficiency.

A constant search for effective methods of situation assessment and forecasting for substantiating decisions and planning the combat operations of units and subunits at exercises, synthesis and practical adoption into staff work practices of advanced know-how in utilization of means of automation and advances in military science make it possible to raise even higher the level of proficiency of commanders and staff officers and to develop and reinforce in every officer those moral-fighting qualities essential in today's combat.



3024
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BRIEF BIOGRAPHIES OF SOYUZ T-14 CREW

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) p 9

[Article: "On the Soyuz T-14 Mission"]

[Text] In conformity with the space exploration program, the Soyuz T-14 spacecraft, carrying a crew consisting of mission commander Lt Col Vladimir Vladimirovich Vasyutin, flight engineer twice Hero of the Soviet Union Pilot-Cosmonaut USSR Georgiy Mikhaylovich Grechko, and mission specialist Lt Col Aleksandr Aleksandrovich Volkov, lifted off the launch pad at 1639 hours Moscow time on 17 September 1985.

Lt Col V. Vasyutin was born on 8 March 1952 in Kharkov. In 1969 he entered the Kharkov Higher Military Aviation School for Pilots imeni twice Hero of the Soviet Union S. I. Gritsevets. Upon graduation he served as an instructor pilot in the Air Forces. He became type-rated in several aircraft. Vladimir Vladimirovich has been a member of the CPSU since 1972. He enrolled in the cosmonaut corps in 1976. He graduated from test pilot school in 1977. Lt Col V. Vasyutin has the Military Pilot 1st Class and Test Pilot 3rd Class ratings.

Twice Hero of the Soviet Union Pilot-Cosmonaut USSR Georgiy Mikhaylovich Grechko was born on 25 May 1931 in Leningrad. After graduating from the Leningrad Mechanical Engineering Institute in 1955, he went to work at a design office. He was involved in the development and testing of space hardware and proved to be a knowledgeable specialist of considerable initiative. In 1984 he was conferred the degree of doctor of physical and mathematical sciences. G. Grechko has been a member of the CPSU since 1960. He joined the cosmonaut corps in 1966. Georgiy Mikhaylovich flew on two prior manned space missions: the first in 1975 as flight engineer on the Soyuz 17 spacecraft and the Salyut 4 station, and the second in 1977-1978 on the Soyuz 26 spacecraft and the Salyut 6 station.

Lt Col A. Volkov was born on 27 May 1948 in the city of Gorlovka, Donetsk Oblast. After graduating from the Kharkov Higher Military Aviation School for Pilots imeni Twice Hero of the Soviet Union S. I. Gritsevets in 1970, he served as an instructor pilot in the Air Forces. He became type-rated in several aircraft. He has the Military Pilot 1st Class and Test Pilot 2nd

Class ratings. A. Volkov has been a member of the CPSU since 1973. He joined the cosmonaut corps in 1976.

The Soyuz T-14 spacecraft docked with the Salyut 7 - Soyuz T-13 orbital complex at 1815 hours Moscow time on 18 September 1985. Together with Comrades V. Dzhanibekov and V. Savinykh, the crew members proceeded to perform the scheduled mission scientific and technical investigations and experiments.

Vladimir Dzhanibekov and Georgiy Grechko returned to the Earth on board the Soyuz T-13 spacecraft on 26 September, while cosmonauts Viktor Savinykh, Vladimir Vasyutin, and Aleksandr Volkov are continuing their work in orbit.



3024
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GSFG AIR FORCES MUSEUM HELPS INDOCTRINATION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 10-11

[Article, published under the heading "Military-Patriotic Indoctrination," by Maj N. Antonov: "Traditions on the Line"]

[Text] Air Forces commanders and political workers, party and Komsomol organizations in the Group of Soviet Forces in Germany attach considerable importance to indoctrination of personnel in our fine fighting traditions. This work is being conducted especially aggressively at the present time, in the year of the 40th anniversary of the Great Victory and preparations for the 27th CPSU Congress. It has been enriched with new forms and methods. Get-togethers with combat veterans and veterans of the Great Patriotic War are held on a high ideological and organizational level here. By their examples young aviation personnel learn courage and valor, total faithfulness to communist ideals, and love of the homeland. Military rituals, the honor of flying a training sortie in the place of a regimental hero, plus many other devices are also being skillfully utilized in this important activity.

Enlisted men's clubs and officers' clubs are extensively engaged in activities aimed at indoctrinating aviation personnel in a spirit of Soviet patriotism. The pace is being set by the staff at the officers' club where Capt A. Nenko works. Implementing the demands of the CPSU Central Committee decree entitled "On Measures to Improve Utilization of Club and Athletic Facilities," the staff of this cultural-educational establishment is stepping up its activities directed toward ideological indoctrination of military personnel and the members of their families. In particular, the staff skillfully utilizes the combat glory museum of the air forces of the Group of Soviet Forces in Germany. Political section and officers' club officers L. Ignatenko, V. Moskvitin, A. Galkin, V. Martynov, and A. Nenko, WO A. Yakovlev, and others have at different times made a large contribution toward its establishment and toward building the museum collection. To date the museum has been visited by thousands of military personnel, and it has left an ineradicable mark in the heart and consciousness of every visitor. The museum helps instill in aviation personnel total devotion to the cause of the Communist Party, love for the homeland, readiness and willingness to stand to its defense, faithfulness to the oath, to military duty, and to their unit colors.

...Aircraft stand in frozen silence in a small area under the crowns of venerable trees: there are examples of fighter, fighter-bomber, and reconnaissance aircraft, plus a helicopter. All of them at various times were among the aircraft guarding the airspace of our homeland and that of the countries of the socialist community. Now, gathered together, these combat aircraft embody stages in the growth of the might of Soviet aircraft. Nor is it mere happenstance that one's visit to the combat glory museum of the air forces of the Group of Soviet Forces in Germany begins precisely at this symbolic site.

A group of aviation personnel was standing by a skillfully-constructed mock-up of an Il-2 ground-attack aircraft.

"This aircraft had no counterpart whatsoever in any one of the belligerent armies during the Great Patriotic War and World War II," explained the guide, Capt A. Nenko, instructor at the garrison officers' club. "In this aircraft Soviet pilots flew strikes on enemy ground units, fought successful air-to-air battles with fighters, and were even capable of attacking bombers. Ground-attack aircraft crews performed a great many heroic exploits. Here is just one of them.

"An Il flown by Lieutenant Khukhlin was disabled during a ground-attack strike on Hitlerite forces. The pilot made a forced landing. His wingman, Lieutenant Konyakhin, decided to rescue his flight leader and the latter's aerial gunner, Sharkov. Firing machinegun bursts at the Hitlerites who were converging on the disabled Il, he landed his aircraft alongside it and took the downed aircrew on board, squeezing them in with his gunner. The fascists opened fire on the intrepid lads, but it was too late: the aircraft was airborne. Both aircrews returned safely to base....

This is only one example of the courage and heroism of the pilots of the famed 16th Air Army. The guide continued his spiel in the museum's exhibit rooms. The first room was devoted to V. I. Lenin. Exhibits include photographs, copies of orders and instructions, and other documents attesting to the great attention which Vladimir Ilich devoted to training of aviation cadres, reorganization of the aircraft industry, and the combat employment of aircraft. Viewing the exhibits in this room, young aviation personnel gain a clearer picture of V. I. Lenin's role in matters pertaining to organizational development of the Air Forces.

At the beginning of 1923, at the initiative of and under the direct guidance of the party, a movement was launched in our country under the slogan "Working people, build an Air Force!" Tens of thousands of patriots responded to this appeal. Many squadrons organized on funds collected by working people were given the V. I. Lenin name designation. This room also contains models of the first Soviet aircraft built by the Soviet aircraft industry. The increased power of Soviet military aviation, its first-class equipment and weapons, and the excellent moral-fighting qualities of its pilots helped accomplish the crushing defeat of the Japanese aggressors at Lake Khasan and on the Khalkhin-Gol River.

The next museum rooms are devoted to the Great Patriotic War and the distinguished combat history of the 16th Air Army. It began to be formed on 8 August 1942, with its baptism of fire taking place in September in the skies over Stalingrad. Those were difficult times. Numerically inferior to the enemy, Soviet pilots were superior in strength of spirit, staunchness, and courage. They were defending their homeland, displaying marvels of bravery. The documents on display at the museum tell, for example, of the exploits of the pilots of the regiment commanded by I. Kleshchev. In a single day of air-to-air combat they downed 34 enemy aircraft, losing only one of their own.

Numerous display boards contain photographs of intrepid combat pilots. These include photographs of I. Chumbayev, who downed an Fw-189 with an aerial ramming, after which he succeeded in safely landing his aircraft, Heroes of the Soviet Union V. Makarov, I. Motornyy, and Z. Simonyuk, who scored 44 kills in the skies over Stalingrad.

The newspaper of the 16th Air Army, DOBLEST, called upon aviators to emulate these heroes. Battle-front issues of the newspaper are exhibited in a special display case. Their yellowed pages bear witness to a time of savage battles with the enemy.

When talking about heroes and heroic deeds, the museum guides -- members of the staff of the garrison Officers' Club -- direct the visitors' attention to the enormous work performed by political workers, party and Komsomol organizations to mobilize personnel for successful execution of the combat missions assigned by the command authorities.

"Commanders and political workers explained to the men the state of affairs at the fronts, publicized the combat experience of outstanding pilots, technicians, and aircraft mechanics, and arranged get-togethers between new men and the veteran combat pilots," Captain Nenko continued his presentation. "Political workers, party and Komsomol activists utilized the following in their activities: status reports on the battlefront and home front, newspaper readings, brief discussions on topics of concern, and reports on outstanding-performance fellow soldiers. Party-political work forms and methods which proved quite effective during the war years are being improved and successfully utilized today in the course of flight operations and tactical air exercises."

A substantial display is devoted to the fighting on the Kursk Salient. More than 250 air-to-air engagements, in which 203 Hitlerite aircraft were downed, were fought on 5 July, the first day of the battle. Three times Hero of the Soviet Union Mar Avn I. Kozhedub flew his first combat mission there. He shot down his first enemy aircraft on 6 July 1943 and scored his last kill, his 62nd, on 30 April 1945 over Berlin. During this time he took part in 120 aerial engagements and was not shot down once.

Many Soviet pilots covered themselves with unfading glory in the flaming skies over Kursk. Lt S. Kolesnichenko, for example, shot down 16 enemy aircraft. He scored three kills in a single day, on 5 July. Lt S. Kolesnichenko was awarded the title Hero of the Soviet Union for courage and heroism.

Groups of aviation personnel pass from room to room, from one display case to the next. The years pass and the names of the operations change, but one thing remains unchanged -- the leadership role played by Communists in the struggle against the enemy. The more difficult the situation at the front became, the more strongly the Communists cemented together aviator ranks. The party organizations of aviation units devoted considerable attention to gaining new members. For example, 1,719 persons were accepted to probationary and full party membership in the first four months of 1944. On the eve of the fighting to liberate Belorussia, the 16th Air Army contained more than 17,000 full members and probationary members of the All-Union Communist Party (of Bolsheviks).

The Hall of Glory completes the exhibit devoted to the Great Patriotic War. This room displays summary figures on the performance of the aviators of the 16th Air Army. During the war years they flew almost 288,000 sorties and destroyed 5,000 enemy aircraft, 3,700 tanks, and killed more than 170,000 enemy officers and men. One out of every three of the large strategic formation's regiments was redesignated a guards regiment, and many received honorary designations. More than 27,000 pilots, navigators, technicians and aircraft maintenance specialists were awarded medals and decorations. More than 200 were awarded the title Hero of the Soviet Union. Ye. Savitskiy, A. Borovykh, and V. Golubev were awarded this title twice, while I. Kozhedub was awarded the title Hero of the Soviet Union three times.

The museum contains an abundance of materials relating how aviation personnel in the Group of Soviet Forces in Germany are carrying on the fine traditions of the combat veterans. In their daily labors the successors of military fame demonstrate faithfulness to traditions and display the finest moral qualities of the Soviet citizen. The names of Capt B. Kapustin and Sr Lt Yu. Yanov have become famous. When they experienced engine failure in the air and their aircraft began plunging toward the town below, they accomplished the almost impossible feat of turning the aircraft away from a residential district and averted considerable loss of life at the cost of their own lives. The names of these officers stand side by side with those of famed combat pilots from the war. Pilots L. Shkarupa and M. Krylov, who distinguished themselves in carrying out an important mission, also performed like genuine war heroes.

Military aviators in the Group of Soviet Forces in Germany learn to hit the target with their first bomb, first missile, and first rocket, to wring every last bit of performance out of their aircraft. A special display board contains photographs of vanguard pilots, navigators, engineers, and technicians. The very best aviation personnel have been given this high honor for excellent performance in military labor. They include Military Pilots 1st Class V. Telyatev, G. Kushnir, and others. V. I. Lenin's behests to study military affairs properly, to be alert, and to strengthen combat readiness and discipline have become for them a fighting program of action, a tried and proven rule of conduct. They are preparing to mark the 27th CPSU Congress with additional excellent achievements in military labor.

Aviation personnel of the Group of Soviet Forces in Germany are standing combat watch shoulder to shoulder with the men of the Air Force and Air Defense Forces of the National People's Army of the GDR. One of the museum's

rooms acquaints the visitor with the combat training of these brothers in class and brothers in arms. Extensive opportunities for internationalist indoctrination of the aviation personnel of the allied armed forces are presented in the course of joint tactical air exercises, command and staff exercises, during fighting alliance weeks, youth festivals, athletic meetings, and special evening activities. Numerous photographs, mementoes and souvenirs attest to this.

...The museum tour is over, but the young aviation personnel are in no hurry to leave. Many of them have received their duty assignments and now ask Captain Nenko about their assigned units' fighting history and traditions. The latter replies to their questions and tells them that combat glory rooms or museums have been established in all Air Forces units in the Group of Soviet Forces in Germany, to which newly-assigned personnel always pay a visit.

Indeed, from their very first days of duty in Air Forces units in the Group of Soviet Forces in Germany, aviation personnel are indoctrinated in a spirit of the fine fighting traditions, in the heroic spirit of the past and present, in examples of selfless service to the homeland. Commanders and political workers arrange a festive welcoming ceremony for the young replacements and acquaint them with the history of the unit and the exploits of the regiment's heroes, performed during the war years and in peacetime. This fine custom has become a regular practice in every outfit. One can scarcely overemphasize its importance. M. I. Kalinin stated in this regard: "Every new conscript reporting for duty to his regiment should know not only its number but also be familiar with its entire combat history, with all its heroes and combat decorations, all its victories in competitions and maneuvers, so that he is proud of his regiment and always defends its honor."

Staff personnel of cultural and educational establishments also take active part in heroic-patriotic indoctrination of aviation personnel. For example, staff personnel at the officers' club at which Capt A. Nenko works, in addition to museum guided tours, holds specific-topic morning activity events and get-togethers entitled "We Shall Build Upon the Fame of Our Fathers," "Faithful to Traditions," etc at the Air Forces Combat Glory Museum of the Group of Soviet Forces in Germany. Young aviation personnel, upper-graders, who in the near future will become armed defenders of the homeland, veterans of the Great Patriotic War, and older-generation pilots are invited to take part in these activities. Especially memorable were get-togethers with Mars Avn S. Rudenko and I. Kozhedub as well as other heroes of the wartime skies. The young military personnel received a big psychological boost, gained a keener feeling of personal involvement in the heroic deeds of the men of their regiment, and became eager to add to the fame of their predecessors with their own combat expertise.

The people at the garrison officers' club maintain close contacts with the newspaper and with School No 89. They get the schoolchildren involved in military-patriotic work and in the search for new mementoes and documents for the museum. This year, for example, students gathered materials on 22 Heroes of the Soviet Union -- pilots of the 16th Air Army. Many of the schoolchildren are thoroughly familiar with the large strategic formation's

combat history and enjoy serving as museum guides. It has become a tradition to hold the Komsomol membership card presentation at the museum for outstanding boys and girls. All this helps familiarize young people with heroic exploits and instills love of the Air Forces and the desire to join the ranks of the winged warriors.

The museum is young; it has a big future. The command authorities, political section, and officers' club give thought and concern to this. Plans call for setting up a new display, devoted to vanguard performers in pre-congress competition, those who are confirming by concrete actions their dedication to the fighting traditions of the older generations of air warriors.



3024
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CAMPAIGN AGAINST ALCOHOL GATHERS MOMENTUM

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 12-13

[Article, published under the heading "Dissemination of Legal Information," by Candidate of Legal Sciences Col Justice V. Gushchin, assistant judge advocate general: "Sobriety -- An Accepted Standard"]

[Text] Perfecting the developed socialist society involves resolving a number of large, complex problems, first and foremost that of increasing the consciousness of the masses, resolutely abandoning obsolete, backward views and pernicious habits, and eradicating carryovers from the past. One such problem is that of overcoming drunkenness and alcoholism.

From ancient times alcohol has been a handy implement in the hands of the ruling classes, which enslaved and exploited the working people, the source of material gain. The power of customs (weddings, christenings, wakes, etc) connected with the consumption of alcoholic beverages was used for centuries by the exploiters to fog the consciousness of the people.

The socialist society cannot accept this pernicious legacy. Heavy drinking and alcoholism in our conditions is a manifestation of dissoluteness, a result of inadequate upbringing and emulation of the bad habits of the past.

A weakness for alcohol hinders a person's political and cultural growth, diminishes one's social activeness, negatively affects the upbringing of the younger generation, causes families to weaken and disintegrate, results in orphans, the birth of sick and defective babies, and causes other human tragedies. Drunks gradually degrade themselves morally and intellectually and hold aloof from socially useful labor. Having lost their social bonds, they lose their sense of duty to society and their family, become cynics and egotists, and are transformed into parasites.

CPSU strategy toward drunkenness has always been clear-cut and unequivocal: drunkenness and alcoholism are a social evil, incompatible with the ideals of communist ethics and morality, and must be implacably combated. V. I. Lenin considered drunkenness to be one of the worst enemies of the revolution. In his address entitled "To the Public," written in November 1917, he made an

impassioned appeal for a merciless campaign against drunkenness and against everything which was impeding victory of the revolution.

A constant campaign has been waged in the socialist society against this negative phenomenon. It became particularly intensified following the issuing of the CPSU Central Committee decree entitled "On Measures to Overcome Drunkenness and Alcoholism." It stresses the need to step up the efforts of workforces and law enforcement agencies to eliminate the causes and conditions which give rise to drunkenness and alcoholism; to increase the responsibility of leader-Communists for establishing in all collectives an attitude of intolerance toward all instances of drunkenness. The decree notes that citizens, and especially youth, should be more aggressively enlisted into sociopolitical affairs and the scientific-technical creative process, awakening in them a profound interest in art and sports. The Central Committee rigorously demands that measures be taken against persons guilty of drinking alcohol on the job, in public places, as well as persons engaged in the illegal distillation and sale of alcoholic beverages.

The demands of the CPSU Central Committee decree also apply in full measure to military collectives. Drunkenness is an absolutely intolerable phenomenon in the USSR Armed Forces. It is incompatible with successful and honorable performance of one's military duty, job-related duties, and maintaining subunits and units in a continuous state of combat readiness.

When consuming alcohol a serviceman is in fact putting himself out of commission for a certain period of time, thus diminishing his subunit's combat readiness and fighting efficiency. Consumption of alcohol by military personnel can cause particular harm when on guard duty, on alert duty, when servicing aircraft and weapons in particular, during operation and maintenance of fixed-wing and rotary-wing aircraft and trucks, that is, wherever increased vigilance, particular alertness and precision are required of a person.

One could divulge a military secret when in an inebriated state. There is an apt folk saying: that which is in a sober man's mind is on a drunken man's tongue. Extended-service aircraft mechanic Jr Sgt V. Grobov, for example, was drinking while traveling on a passenger train. Losing all inhibition, he proceeded to brag to his compartment companions, divulging information of a military nature which was known to him by virtue of his military service. Grobov later stated in court that if he had been sober he would not have committed the criminal act. Yes, it was vodka which had brought him to the prisoner's dock.

As we know, persons who have committed criminal acts while intoxicated are not freed of criminal liability; in addition, the law states that in such an instance intoxication constitutes an aggravating factor. This was taken into consideration by the military tribunal in sentencing V. Grobov.

Alcohol can bring discord to a unified, cohesive combat family of fighting men and in some cases can lead to abnormal relationships between military personnel. Precisely this was the case, for example, in an aviation support subunit. Pfcs V. Kremkov and A. Gerbeyev, in a state of inebriation, conducted themselves in an uncomradely manner toward their fellow soldiers. A

preliminary inquiry established that prior to this time company commander Sr Lt S. Grek had on 3 occasions placed Kremkov on report for drinking, but in none of these cases did he actually take any disciplinary action. Believing that he could act with impunity, Kremkov failed to alter his behavior and soon committed a military offense together with Gerbeyev, for which criminal charges were brought against him.

This example graphically shows that drunkenness is an evil which always brings serious consequences. But I should also like to draw attention to another thing -- to connivance on the part of some command personnel. In this instance, if Sr Lt S. Grek had taken severe disciplinary action against the culprit at an earlier time, if he had conducted appropriate indoctrinational effort in the subunit, I believe the criminal offence could have been prevented.

It is stressed in military regulations and the military oath of allegiance that a member of the military bears personal responsiblity for defense of his homeland and shall be ready at all times to carry out this sacred duty on orders by the Soviet Government. Regulations state that every member of the military shall obey the law to the letter, shall at all times serve as an example of correct behavior, modesty and restraint, shall rigorously observe the requirements of Communist ethics and morality, and shall behave with dignity when in public. Implementation of these demands excludes the consumption of alcohol both on and off duty. The appearance of a member of the military in a state of intoxication evokes perplexity and righteous resentment on the part of Soviet citizens. They feel insulted when they see under the influence of alcohol a person to whom they have entrusted a most important task -- defense of our homeland.

Drunkenness among command personnel of all echelons is especially intolerable, and this is understandable. A commander (superior) who has clouded his mind with alcohol is unable and lacks the moral right to command and to lead subordinates, for in such a state he not only causes harm to the cause of strengthening military discipline and carrying out the tasks assigned to the subunit and unit, but also discredits himself in the eyes of his men. Those instances of exceeding authority and demeaning the honor and dignity of subordinates which are sometimes encountered occur as a rule under the influence of alcohol. Nothing has such a harmful effect on the political state, morale and conduct of personnel as improper actions and abuse of alcohol by command personnel.

In view of this fact, the CPSU Central Committee decree entitled "On Measures to Overcome Drunkenness and Alcoholism" contains the demand that party organizations hold more strictly to account party members, and particularly ranking officials, guilty of abusive consumption of alcohol, who fail to take measures against drunkenness, and who avoid direct participation in combating this evil. Party, soviet, economic, trade union, and Komsomol officials who have a weakness for alcohol and who take part in heavy drinking must be fired from their positions, while party members must be made strictly accountable for such behavior, including expulsion from the CPSU. The decree emphasizes that it is the duty of each and every party member, each and every person in a

leader position to display a personal example of an aggressive campaign against this disgraceful phenomenon.

By ukase of the Presidium of the USSR Supreme Soviet, entitled "Stepping Up the Campaign Against Drunkenness," which went into effect on 1 June 1985, officials at all echelons are to be held more strictly accountable not only for taking part in drinking bouts with their subordinates but also for failing to take measures to fire a habitual drunk from his job as well as for covering up even a single instance of drinking alcohol on the job or a person reporting for work in an intoxicated state. A fine of from 50 to 100 rubles is specified for such an infraction on the job.

This provision of the law is for the purpose of acting, alongside measures of community pressure, to foster increased responsibility on the part of officials at all levels at enterprises, establishments, in organizations and associations to ensure proper order and discipline at the work station. We should emphasize thereby that imposition of a fine and application of party or Komsomol disciplinary measures against a violator does not exclude the use of disciplinary penalties as well as loss of bonuses, compensation based on the year's work performance, incentive-type vacation travel packages, advancement on housing waiting lists, etc. This provision also applies in full meausure to aviation enterprises and other military aviation collectives.

As already noted, extremely serious consequences can ensue when a person under the influence gets behind the wheel of an automobile or other vehicle. It is for good reason that stiffer penalties have now been established for drunk driving, as well as for permitting an intoxicated person to operate a vehicle. Such an act, even if no accident occurs, shall be punishable by a fine in the amount of 100 rubles or loss of driver's license for a period of from one to three years.

If such an infraction is repeated within a period of one year, criminal charges shall be brought, and guilty parties shall be sentenced to up to one year in jail, or up to two years of corrective labor, or a fine in the amount of 300 rubles. In addition, a convicted driver shall lose his driver's license for a period of from three to five years. Persons without a driver's license who drive under the influence shall be fined in the amount of 100 rubles.

We should emphasize that according to present laws military personnel are not subject to fines imposed by administrative order. Disciplinary and community-influence measures are applied to military personnel. Military drivers observed consuming alcohol shall be kept from driving vehicles during their entire term of service in the army and navy.

Officials responsible for the technical state and maintenance of vehicles shall bear particular responsibility for ensuring road safety and preventing motor vehicle accidents. Therefore persons who allow drivers to take the wheel while intoxicated shall be fined in the amount of 100 rubles. If such an infraction results in bodily injury, substantial property damage or other serious consequences, the culpable officials shall be sentenced to up to five years in prison, or up to two years of corrective labor, or shall be fined in

the amount of from 100 to 300 rubles and shall be prohibited from holding a position involving responsibility for the technical state or operation of vehicles for a period of up to five years.

Implementation of the new measures undertaken by the party and state will help create an atmosphere of intolerance toward drunks and those who aid and abet this evil by failing to take notice of it. Unquestionably administrative-legal measures alone are not enough. Also needed is an aggregate of organizational, indoctrinational, and medical measures. As is noted in the CPSU Central Committee decree, this work must take on a genuinely mass, nationwide character. An atmosphere of intolerance toward chronic heavy drinkers and violators of discipline should be established in every collective.

In the army and navy, commanders, political workers, military legal personnel, party and Komsomol organizations have been assigned the task of eradicating this evil resolutely, persistently, and consistently, displaying intolerance toward those with a fondness for alcohol, and creating an atmosphere whereby constant adverse attention will be focused on those with a weakness for alcohol.

Practical experience attests to the fact that this task is being successfully accomplished wherever, alongside the prescribed measures, adequate attention is being devoted to good organization of off-duty activities and intelligently-spent leisure time for personnel, where mass sports activities are conducted on a regular and systematic basis, where amateur performing activities are conducted in a vigorous manner, and where various excursions and field trips are organized. In particular, this is the way things are being handled in the aviation collectives in which commanders and political workers officers V. Zakharov, A. Ryzhakov, M. Esalnek, A. Anfilogov and many others serve.

Indoctrination of military personnel in a spirit of sobriety and an attitude of intolerance toward hard drinking is an important direction to take in the area of further strengthening discipline and order and increasing combat readiness.



3024
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NEW BOOK ON DESIGNING, BUILDING SPACE HARDWARE FOR SCIENCE, TECHNOLOGY APPLICATIONS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) p 13

[Review, published under the heading "New Books," of book "Narodnokhozyaystvennyye i nauchnyye kosmicheskiye kompleksy" [Economic and Scientific Space Systems] by V. S. Avduyevskiy and G. P. Uspenskiy, Mashinostroyeniye, Moscow, 1985, 413 pages, 1 ruble 70 kopecks: "Designing Space Systems"]

[Text] A book has been published which expounds the principles of construction and the specific features of designing large systems such as economic and scientific space systems. It summarizes the experience in developing space hardware which has been amassed over the span of more than two decades.

According to the classification proposed by the authors, a space system [kosmichskiy kompleks] consists of space vehicles, ground telemetry and data devices, and flight control facilities. Depending on the tasks assigned each such system, they can be used to observe the Earth and its atmosphere, for communications and navigation, and in the interests of science.

The book consists of two parts. The first part deals with the problems of designing economic space systems. Many branches and sectors of the economy have a stake in their development. The authors divide all systems into categories on the basis of analysis of the tasks assigned by science and practical application, taking adopted criteria into account.

Earth remote sensing systems encompass the greatest number of economic branches and sectors, they are used in agriculture and forestry, in land reclamation and geology, and in power engineering.... They help in determining the location of mineral deposits and in crop forecasting, in estimating moisture reserves and the ice situation on navigation routes, and they help monitor processes taking place in the atmosphere and in weather forecasting.

Airmen, seafarers, geologists and other specialists desire the capability to make a precise determination of their current position. Navigation satellite systems help accomplish these tasks.

TV broadcasting and telephone services are accomplished with the assistance of communications satellites, and they are used to transmit typeset newspapers and magazines. Industrial systems are designed to produce in space unique products for the electronics, optics, metallurgical, chemical, and drug industries.

All these systems are examined in this volume from the standpoint of a systems approach during the design process. Interesting facts and figures are presented, synthesizing utilization of space hardware in the interests of the economy.

The second part of the book deals with scientific systems. Scientific satellites study near-earth space, investigate the upper atmosphere, the magnetosphere and the mechanism of its interaction with the interplanetary medium, and determine the conditions of passage of radio waves and the sun's influence on life on Earth. Only with the assistance of space hardware did it become possible to discover the secrets of the Moon, the planets of the solar system, and comets. Astrophysical satellites observe and listen to the deep reaches of the universe.

Scientific space systems provide information which nourishes new theories and hypotheses, which in turn engender new tasks and requirements on hardware.

The authors demonstrated that the designing of space systems is directed toward obtaining maximum effect within the framework of existing technical capabilities. Methods of systems design and determination of promising future unmanned and manned space systems of scientific and economic designation have been devised toward this end. This volume, illustrated with diagrams, sketches, drawings and tables, is intended for a broad readership of engineers and scientific workers.



3024
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SQUADRON COMMANDER'S IMPORTANCE AS MENTOR OF YOUNG COMMAND PERSONNEL

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[Article, published under the heading "Pre-Congress Competition Leaders," by Maj V. Dolgishev: "School of the 1st Squadron"]

[Text] Squinting from the blinding sun, the exercise director looked out over the range. From his observation post he had a clear view of the silvery MiG flashing like lightning in a break in the clouds. Black burst plumes rose skyward out on the range, where the "enemy" missile launchers were deployed.

"An excellent job," the general stated with satisfaction. "One can immediately tell a pilot schooled in Afghanistan. You know who just flew that bombing run? Lieutenant Colonel Stepanov, commander of an excellent-rated squadron, which at one time was assigned to the limited contingent of Soviet forces in the DRA."

...The squadron's aviators were faced at that time with difficult, important missions involving internationalist assistance to the friendly Afghan people. And they performed all missions honorably. The majority of the combat pilots, including Lt Col M. Stepanov, were awarded lofty government decorations. The squadron commanding officer unquestionably deserved a large share of the credit for the aviators' success.

The command, professional soldier, and moral-psychological qualities of party member Stepanov were manifested in a broad and diversified manner in the skies over Afghanistan. It is a complicated and responsible task to be a squadron commander in the course of routine combat training. This task is immeasurably more complex and critically important in the DRA. And the squadron commander decided to begin at the very outset by displaying personal exemplariness in performance of his job. It would seem that he, an expert-marksman military pilot with a great deal of experience, would not have to be particularly concerned about this. But Mikhail Vasilyevich thought otherwise. He studied in detail the air operations area, the peculiarities of the area's topography, the operational methods of the dushman [bandit] units, and studied the experience of his predecessors. Ensuing events confirmed the usefulness of this preliminary work. From their very first days on Afghan soil, Lieutenant

Colonel Stepanov displayed for his men an example of professional expertise, moral staunchness and composure.

As a rule the squadron commander would be the first to take off on combat training missions and to lead variously-tasked groups. His calm voice inspired confidence in his men. The combat aviators successfully handled what at times were very substantial psychological and physical stress loads, experienced in the course of intensive operations. The commanding officer's energy, personal composure and heroic example exerted a vigorously positive psychological influence on his men and helped develop in them excellent moral-fighting qualities.

...The incident took place during scheduled training sorties. Dusk was falling when a two-aircraft flight led by Lt Col M. Stepanov took off. After completing the assigned mission, the pilots proceeded to head back to their home field. They suddenly spotted a truck convoy proceeding along the highway toward Kabul. A gasoline tanker truck was on fire at midpoint in the truck column. Thick black smoke was rising skyward, and flashes of flame stood out in vivid contrast against the smoke background -- dushman were firing heavy machineguns.

Property was being destroyed down there, and people's lives were in jeopardy. The aircraft were carrying live munitions. They had to act! Lieutenant Colonel Stepanov, reporting the situation back to his base, requested permission to hit the hostile weapon positions. The two aircraft, Stepanov leading, delivered an accurate, devastating strike, neutralizing the bandit weapon positions.

On this mission, which constituted a contribution to the annals of courage, patriotism and internationalism which Soviet fighting men are writing in the skies over Afghanistan and on Afghanistan soil, Lieutenant Colonel Stepanov acted boldly, decisively, and with initiative, giving his men a graphic lesson in combat.

The combat pilots from the war who had served in Mikhail Vasilyevich's regiment had fought precisely in this manner, and they developed just such qualities in subsequent generations of air warriors. Regimental veteran D. Goldyrev, who finished the war as a squadron deputy commander, related the following about how flight personnel taught effective air combat techniques during the Great Patriotic War: "The Battle of Kursk would begin in a month's time. We young pilots utilized this time to improve our flying skills on training flights. The veteran air aces took us continuously under their wing, one might say. They taught us that in combat it is important skillfully to suppress certain feelings (fear, confusion) and to intensify others (hatred toward the enemy, sense of honor, duty). It followed from the experience which they shared with us and from the battle stories they related that the enemy was strong, clever and cunning, but that he could be and must be defeated. They gave practical recommendations in the form of generalized rules of conduct of air-to-air combat: if you break first in a head-on attack pass, you will be shot down; stay with your flight leader, since a single aircraft is easy prey for enemy fighters; if you find yourself alone, try to

join the closest friendly aircraft or two-aircraft element as quickly as possible; cover your flight leader well, even at the cost of your own life."

Remembering the lessons taught by his mentors, and guided by these precepts, Sr Lt D. Goldyrev shot down two fascist aircraft on the very first day of combat operations on the Kursk Salient, and one of them -- a Messerschmitt -- in a head-on pass. Firing at point-blank range, he delivered devastating fire on the Hitlerite, who had wavered and faltered in the air-to-air engagement. The other young pilots, who had also been tutored by veteran air warriors, also performed with success.

Lieutenant Colonel Stepanov, taking an example from the war veterans, also serves as mentor to the young aviators. Skillfully utilizing the strength of the subunit party and Komsomol organizations, with the most active participation by the squadron political worker, the officers assigned to squadron headquarters and the flight commanders, he succeeded in unifying the men into a close-knit fighting outfit. And as we know, any task is more easily accomplished with teamwork.

A sense of danger, a factor which made the men's work more difficult, was particularly in evidence in the DRA. For this reason it was necessary to boost the moral-psychological preparedness of aviation personnel. The tasks assigned to each individual were clearly and precisely formulated, and party and Komsomol activists were distributed among work assignments. Party-political work in the subunit began to be conducted in a flexible and purposeful manner, and various forms of this work: brief rallies, party and Komsomol meetings, conferences and discussions began to be utilized more efficiently. A system of political and combat briefings for military aviation personnel proved effective, with 10-15-minute briefing sessions each day.

At the initiative of the party organization, activists publicized the squadron's fighting traditions, exploits by military aviation personnel, vivid examples of faithfulness to military duty, and in talks demonstrated the experience of actions by pilots who were carrying out their internationalist duty in the DRA, in particular recipients of the title Hero of the Soviet Union pilots V. Gaynutdinov, V. Shcherbakov, V. Pavlov, Ye. Zelnyakov, V. Kot, and others. The "Exchange With the War Experience" display, dedicated to the 40th anniversary of the Great Victory, was highly popular. It featured heroic deeds by combat pilots in the concluding phase of the Great Patriotic War and the squadron's successes being achieved today. Such a form of party-political work as get-togethers with military personnel who have been awarded medals and decorations and who have distinguished themselves in past combat sorties has proven quite effective.

Comradely mutual assistance and support experienced further development in the subunit. In the intervals between combat sorties, pilots exchanged experience in moral-psychological preparation to operate in difficult conditions under dushman fire. All this helped develop excellent moral-fighting qualities in the subunit's military aviators: staunchness and composure, courage and fearlessness. The majority of combat pilots successfully overcame the psychological and physical stresses in the course of vigorous combat training activities. On some days they would each fly several sorties, but each man

was ready and willing to go into combat again and again. The specialist personnel of the maintenance and support subunits performed flawlessly, smoothly and with precision.

Of course the squadron commander was saddled with no fewer concerns. And one of his main concerns dealt with the development of future command personnel.

At the April (1985) CPSU Central Committee Plenum there was discussion of an urgent need for the strictest observance of Leninist principles of personnel selection, job assignment, and indoctrination. "Wherever these principles are violated," it was stressed at the plenum, "wherever promotions are made on the basis of personal devotion, servility, personal benefit, and protectionism, criticism and self-criticism inevitably suffer, their occurs a weakening of bonds with the masses and, as a result, work failures."

Lieutenant Colonel Stepanov holds that every pilot, navigator, and aviation engineer service specialist has prospects for job and career advancement. But one must earn the right to promotion, go through the school of management and work with others. Such a school exists only in the squadron, because there is a broad area here for practical activity. This school is the mid-level squadron echelon, in which the immediate organizers of combat training, the mentors of combat pilots are formed. Talents are manifested, the characters of future commanders are indoctrinated and that foresight, without which it is dangerous to send a person up solo, is acquired precisely here, at the squadron echelon. Every aviator should go through this school, and not merely in passing, but thoroughly, just as Lieutenant Colonel Stepanov had done.

Of course the jobs of aviation personnel are strictly regimented. Guideline documents specify everything: when and how one should schedule flight operations, how much rest a pilot should receive, and what durations of interruption are allowable in performance of various elements of combat training. Follow regulations and everything will be fine, it might seem. Flying has its specific peculiarities, however. Perhaps more than any other profession, it requires an individual approach to pilot development. It is very important to see first and foremost a person's individuality, the specific features of his character and personality, his strong and weak points, the conditions of his daily life, his state of health, and even his mood just prior to a flight.

Lieutenant Colonel Stepanov is convinced that coordination, collaboration, cooperation and cohesiveness of the combat team are inconceivable without mutual understanding and mutual concern. Mikhail Vasilyevich believes that a person is most strongly offended by a lack of attention and absence of sincere interest in his development. How pleased he was at the successes of his charges A. Kravchenok and Ye. Gorbatyuk, and how much labor he expended to launch them on their careers, so to speak! There is plenty to be proud of now: both military pilots are rated as expert marksmen. Lieutenant Colonel Kravchenok is enrolled at the Military Air Academy imeni Yu. A. Gagarin, and Major Gorbatyuk is deputy commander of an air squadron and is himself teaching young pilots. And neither has forgotten their mentor or their first squadron.

And how Stepanov grieved at the setbacks experienced by Lt A. Mityakov! He was an officer not without ability, but he was barely managing to get through the flight training program. This young aviator was having a particularly difficult time with night landing. The squadron commander, after going up with him, concluded that they could make a pilot out of him, but he would have to be brought to a single approach descent, as it were, for Mityakov was being taught by several instructors and, as we know, each individual has his own landing approach configuration. With the assistance of Mikhail Vasilyevich, Mityakov gradually began flying his supersonic fighter with greater assurance. Soon he began shooting night landings and subsequently earned first class and a promotion.

Many present squadron and regimental-echelon commanders owe a great deal to Lieutenant Colonel Stepanov and have not forgotten the lessons he taught them, and not only professional but moral lessons as well. "Commanding people, working with and understanding them are quite different things," says Mikhail Vasilyevich. "If you do not want to think about others, do not count on gaining respect and understanding within the collective and, consequently, do not expect good results in your work."

The squadron commander's ability to unify the collective and to create a favorable productive atmosphere in the course of combat training not only enhances the quality and effectiveness of military labor but also enables the men to feel that they are masters of their affairs, not to be indifferent executors of instructions by superiors but rather to display intelligent initiative and innovativeness.

This is a logical path: from attention toward each individual to establishment of a school of vanguard experience and professional expertise. It may not be organizationally delineated, but this school of the 1st Squadron is operating, and with great success. This is attested by the fine deeds accomplished by the squadron's aviators during the terrible years of the Great Patriotic War and the end results of the military labor of this collective, until recently led by Lt Col Stepanov, in the skies over Afghanistan.

Mikhail Vasilyevich is presently deputy commander of a fighter regiment. A new position, new and even larger tasks and job duties, and even greater responsibility for the training and indoctrination of future commanders. He must do everything he can to be up to this responsibility, and especially now, he feels, when the human factor is becoming particularly important.

These are the concerns and thoughts of Communist Stepanov on the eve of our party congress. One is both relaxed and anxious taking to the air with these concerns and thoughts, because there are the inevitable questions addressed to oneself: "Are you carrying out your duty as a Communist in full measure? How about your personal duty as a commander?" I believe that the deeds of Lt Col M. Stepanov, a right-flanker in socialist competition in honor of the 27th CPSU Congress, and of his pupils constitute an answer to these questions.


3024
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SOVIET HELICOPTER SQUADRON EXPLOITS IN AFGHANISTAN

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[Article, published under the heading "From an Afghan Notebook," by Hero of the Soviet Union Lt Col V. Ochirov: "About Friends and Comrades"]

[Text] I served two tours of duty as a member of the limited Soviet forces in Afghanistan. On my last tour I commanded a helicopter squadron. Our outfit, giving internationalist assistance to the people of a brother country which has taken the path of building a new life, enjoyed a good reputation. I warmly recall those with whom I served and flew.

I have warm memories of squadron deputy commander Maj Arseniy Nikolayevich Kapustin. How many times he risked his own skin to rescue comrades from a bad situation! He was often the first out on a difficult mission. And his actions in the air evoked admiration even on the part of those who had themselves seen and experienced a great deal.

Once it was necessary to extract an aircrew which had gotten into a difficult situation. Evening was approaching, with dusk closing in swiftly. We took off in two pairs: Capt V. Deryaga and I flying helicopter gunships, with Maj A. Kapustin and Capt A. Kasprov flying transport helicopters. Our two-ship element, deployed laterally, was flying cover -- returning dushman fire, preventing them from hitting the helicopters, while Major Kapustin, with illumination provided by parachute flares released by his wingman, was attempting a landing in a narrow valley squeezed between high mountains. The landing area was of limited size, heavily obscured by dust, and extremely unsuited for landing. In addition, the bandits were delivering almost uninterrupted fire. But Kapustin, risking his own life, succeeded in bringing his ship down in a descending spiral and skillfully landing it. Within minutes the rescue victims were on board and the aircraft was again airborne. The mission has been brilliantly executed.

I also well remember another incident which demonstrated this officer's tactical proficiency. Local Afghan officials came to us with the request that we help them "close down" a mountain trail along which dushman bands were coming into the country. Several scattered abandoned forts lay along this trail. It was decided to put an assault party in by air. A pair of

helicopters led by Maj A. Kapustin and one led by Capt N. Lipin flew this mission. Arseniy Nikolayevich, as the element leader, correctly assessed the situation. Mountains, extending about 30 kilometers, rose skyward close to the forts; dushman reconnaissance could easily lie concealed in those mountains. There were also some small kishlaks [villages], which might also be harboring bandits. It would be necessary to outfox them.

How did the pilots proceed? Approaching the fort, they cut their throttles as if descending. Their rotors threw up clouds of dust, while the helicopters, hovering for a moment, simulated a landing. They did the same thing at the next fort. Then, selecting the proper moment, they finally touched down, concealed behind a dust screen, and the assault party poured out of the helicopters and took up a concealed position in the fort. The two helicopters continued this procedure right down the line to the last fort. Let them try to figure out what the helicopter crews were up to. If they did put troops down, where?

Several hours later, as darkness was falling, the element leader radioed back that they had stopped a large band of counterrevolutionaries moving along the trail, attempting to enter the DRA. The dushman were delivering fire on the heliborne assault force. They needed reinforcements brought in by air. This time Captain Deryaga and I flew cover for Major Kapustin's pair, which carried reinforcements for the engaged assault troopers. The dushman, sustaining heavy losses, were forced to withdraw.

Capt Nikolay Fedorovich Lipin, the squadron's deputy commander for political affairs, contributed a great deal to the outfit's success. He inspired aviation personnel to carry out their military and internationalist duty in an exemplary manner not only by impassioned party word but also by personal example.

I remember in particular the following incident. It was necessary to knock out a radio transmitter, deployed by mercenaries in a cave east of the mouth of the Panjshir Gorge, along with direction-finding equipment which was getting fixes on radio traffic between aircrews and their command posts and determining the helicopters' headings (the bands were utilizing the obtained information to take cover in the mountains and to evade attacks). How could it be knocked out? This was no easy task, particularly since it was difficult to determine its exact location. Captain Lipin led a two-ship element of attack helicopters. Squadron party organization secretary Capt V. Ilin flew as his wingman.

The helicopters flew along a mountain ridge, at the foot of which yawned deep gorges. The mercenaries apparently realized that they had been detected, and suddenly opened fire on the helicopters. They were in real danger of being shot down. But the aircrews of N. Lipin and V. Ilin did not waver. Swinging around, they headed for the target. Lipin's weapon operator, Sr Lt V. Galutskikh, returned the bandits' fire with guided missiles. He hit right on the money. He was backed up by the wingman's weapon operator, Sr Lt A. Arkhipov. The radio was knocked out.

The squadron's aircrews displayed boldness, courage, valor, and composure in the most difficult, at times critical situations. And Afghan officials, who maintained a close working relationship with the squadron, greatly appreciated this. Provincial party committee official Mir-Abdullo and provincial state security official Mir-Zakhan once drove out to our airfield and reported that raids on civilian communities had been stepped up. The dushman, coming from across the border, were terrorizing the populace, shooting at civilians, and torching crops in the fields.

"We can't take it any longer. Help us get rid of the bandits...."

Soon a band numbering several hundred men, led by one Asladdin, appeared in the Iskopol Mountains area. Another round of atrocities, murders, and abusive treatment of local residents began. Several helicopters from our squadron were assigned to conduct surveillance of movements on the roads and trails.

That day I was in the control tower serving as flight operations officer. I heard helicopter pilot Capt A. Gorelikov radio a report that a small caravan had set out from a nearby kishlak, consisting of women, old men, children, pack-laden camels and horses. It had all appearances of an innocent caravan....

Upon determining the precise area, I was struck by a feeling of alarm. "That is in the vicinity of the Iskopol Mountains!" a thought shot through my mind. "How could a caravan leave an area solidly bottled up by Afghan troops? It couldn't be a caravan!" I instructed Gorelikov to drop down and get a closer look at this caravan and, sensing something wrong, I sent up a pair of Mi-8 helicopters carrying assault troopers.

Capt A. Gorelikov and his wingman, Sr Lt P. Shabanov, unsuccessfully attempted to signal the caravan to halt. The element leader reported: "The caravan is continuing to move. They are waving in a friendly manner, as if indicating thanks for our concern but that everything is fine and that they are continuing on their way...."

"How far to the next village?" I asked.

"About a kilometer at most...."

If bandits were attempting to slip out of the danger area with the caravan, if they reached the village they could hole up there, avoiding capture. On my instructions the pair of helicopters led by Gorelikov made another attempt to halt the caravan, with the same result. Then the pair of Mi-8s led by Capt A. Zubrilov appeared on the horizon. In a moment the transport helicopters would be putting the heliborne assault party down, and then the bandits, if they were traveling concealed with the caravan, would be trapped. The mounting tension was too much for one of them: he fired a burst at the helicopters with an assault rifle he had been concealing under his clothing. Now the situation was clear: bandits were attempting to escape from the area. The aircrews of Captain Gorelikov and Senior Lieutenant Shabanov returned fire on the dushman. The caravan came to a halt. Two persons separated from the caravan and

proceeded to head toward the kishlak at a dead run, but they made it only a few meters of the way.

One of the fleeing bandits turned out to be dushman leader Asladdin, while the other was his adjutant. They were carrying weapons, large sums of money, lists and photographs of the members of their band. All these items were confiscated and turned over to the Afghan authorities. Having lost their leader, a few days later the counterrevolutionary band laid down its arms and surrendered.

The people of the province were certainly grateful to the Soviet aviators for their help in eliminating the band! Solayman Laeq, DRA minister of nationalities and tribal affairs, personally came to our airfield to thank the pilots. Capts A. Gorelikov and A. Zubrilov, Sr Lt P. Shabanov and others who took part in this operation were later awarded coveted government decorations.

I flew a good deal with squadron navigator Maj Igor Vladimirovich Bazhmin. I liked his composure, sober-mindedness, and evenness of temper (although at times circumstances did not favor this), his stick-to-itiveness, his exceptional application and diligence. He always conscientiously carries out the assigned task. The following example is illustrative.

One evening an Afghan in his middle years came running up to our squadron compound. It was winter, but he was barefoot and shabbily dressed. What could have compelled this person to undertake a long trek through the freezing cold and snow to us Soviet fliers? We soon found out. It seems that he had learned that a convoy of trucks was supposed to be traveling along one of the roads through the mountains, carrying weapons and ammunition for the dushman scattered throughout the province. And he stated the time when it would be passing between nearby villages.

There was no time to ponder the matter, particularly since it was getting dark. I reported the situation to my superior, received permission to take a helicopter up, and hurried out to the flight line. Major Bazhmin climbed in under the weapon operator's canopy, and we took off. It was completely dark by the time we reached the designated area; the mountainous terrain was illuminated only by moonlight. We could barely make out a mountain ridge looming up on our left. We proceeded parallel with the ridge. When we reached the extremity of the ridge, we adjusted our heading left and spotted headlights off in the distance. A truck convoy was pulling out of the first village, as the Afghan patriot had told us. Judging from the circumstances, it was that same dushman convoy....

We swung around, reversing heading, to lurk in ambush behind the mountain ridge while remaining undetected. It required every bit of attention and composure Igor Vladimirovich possessed in order precisely to calculate our subsequent actions, right down to the minute. He precisely determined the moment when the convoy would reach the midway point between kishlaks, and at the precise moment gave the command to begin our attack run. Once again flying parallel to the ridgeline and then turning toward the target, we found ourselves meeting the convoy head-on. I was amazed at the precise job done by the squadron navigator!

The truck convoy was proceeding along a road knifing into the mountains. The sole road was flanked by snowdrifts, which prevented vehicles from turning off the road or turning back. And it was quite some distance to any villages.... We had hit right on the money. What should our next move be? The dushman themselves determined the further course of events: detecting our presence by our engine and rotor sounds, they opened fire. Major Bazhmin responded to their muzzle flashes by firing missiles.

As we were loitering along parallel to the ridgeline, waiting for the right moment, and as we headed out toward the target, a group of Soviet helicopters carrying assault troops, in response to my orders, was approaching the area. The exchange of fire with the dushman was brief but decisive. Some time later the bandits ceased their resistance. Hundreds of small arms were seized, as well as more than one and a half million rounds of small-arms ammunition, a large number of landmines of foreign manufacture, rockets and chemical munitions. If the bandits had made use of all this, a great deal of innocent blood would have been shed! And in my opinion Major Bazhmin, who expertly handled the assigned task, deserves a good deal of the credit for the fact that the counterrevolutionaries were stopped in their tracks before they could perpetrate additional crimes.

I should like to mention one additional person -- weapon operator Sr Lt Andrey Krylov. His parents were involved with aviation for many years. Working at the Yaroslavl DOSAAF Flying Club, they taught flying skills to youth. Aleksandr also went through that flying club. He took a strong liking to flying, and he expressed the desire for a career in the military. What kind of a job is he doing? The following incident tells the story.

A pair of helicopter gunships led by Capt V. Perelygin took off to support a local self-defense detachment. On their return flight they took dushman fire, which crippled Capt A. Mukhtalov's helicopter. The pilot proceeded to make a forced landing, but the spot was poorly suited for setting down. The helicopter nosed over and flopped onto its right side. The impact was so powerful that the doors and hatches were jammed shut. The pilot and flight technician sustained serious injuries.

Senior Lieutenant Krylov kept his head in the situation. Using an assault rifle to smash the glass in his canopy, he climbed out of the helicopter, which was engulfed in flames, and hastened to extricate the other crew members, although they were continuing to take dushman fire. Shattering the pilot's canopy, he helped the pilot, who had received a head injury, extricate himself from the cockpit, led him some distance from the aircraft and placed him in a sheltered position behind some rocks. He then made his way into the cargo cabin and dragged out the flight technician, who had lost consciousness. Scarcely had he gotten the latter to the shelter of the rocks when the entire helicopter burst into flames. If Andrey had been delayed by a single moment, the pilot and flight technician could have perished.

During this time the element leader was providing air cover. When fuel became critically low, they were relieved by a pair of Mi-8s led by Maj M. Vinnikov. They provided air cover to the downed crew, and subsequently picked them up.

Lt A. Krylov was awarded the Order of the Red Star for his bold, competent actions.

There have been many examples of courage, composure, and the highest standards of military proficiency! I recall with delight the actions of flight commanders Capt Ye. Sukhov, Majs V. Kabdulin and S. Kuzovlev, helicopter senior commanders Capt V. Korikov and Sr Lt V. Vysotin, pilots Capt V. Smirnov and Sr Lts A. Lipovoy and A. Konev, and flight technicians Lt A. Katunin, Sr Lt A. Vasilenko, Capt A. Skripitsa, and Lt V. Shteyngauer. Performing their military and internationalist duty, they have displayed the finest qualities of the Soviet officer. Their courage and skill, staunchness and selflessness evoke feelings of pride and admiration.

The deeds of many of the squadron's aviators performed in the skies over Afghanistan have been honored with coveted government decorations. I give primary credit for the fact that I was awarded the title Hero of the Soviet Union to my comrades in arms, with whom I worked shoulder to shoulder assisting the people of this brother country in defending revolutionary achievements. We should also like to note the selfless military labor of officers P. Kazak, P. Kuznetsov, V. Poleshchenko, B. Zmiyenko, and many others.

The aviators who have served in this squadron are now passing on their wealth of experience to our youth, developing equally courageous, bold sons of the homeland, who are faithful to the cause of the Great October Revolution.



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IMPORTANCE OF SCIENTIFIC, TECHNOLOGICAL ADVANCE TO SOVIET DEFENSE EFFORT

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[Article, published under the heading "Anticipating the 27th CPSU Congress," by Candidate of Economic Sciences Lt Col N. Karasev: "Key Factor of Advance"]

[Text] A businesslike, creative atmosphere has formed in this country on the threshold of the 27th CPSU Congress. Communists and the entire Soviet people, including the men of the USSR Armed Forces, received with great enthusiasm and ardent approval the plan, formulated at the April (1985) CPSU Central Committee Plenum, for speeding up this country's socioeconomic development on the foundation of scientific and technological advance. The party has in mind not merely an increase in the growth rate of the nation's economy. "We are talking," noted CPSU Central Committee General Secretary Comrade M. S. Gorbachev, "about a new quality of our development, a rapid advance in strategically important sectors, a structural reorganization of production, transition to intensive development, efficient forms of management, and fuller resolution of social problems." This idea was also stressed at a conference at the CPSU Central Committee on matters pertaining to accelerating scientific and technological advance, at which discussion covered the achievements of the Soviet economy, shortcomings and difficulties, and ways and means of correcting them.

The Soviet Union has a great deal of which to be proud in development of the economy, science and technology. Our country's successes in various areas of engineering knowledge and technological advance are universally acknowledged. The Soviet Union's achievements in space exploration, for example, are undisputed. This past summer Soviet science and technology added another vivid page to the history of the space program. An important stage was accomplished in comprehensive scientific investigations in the Venusian atmosphere and on the surface of the planet Venus. Soviet cosmonauts have conducted and are presently conducting a number of scientific projects on board the Salyut-7 orbital station.

Our aeronautical engineering people are also at the science and technology forefront. The An-124 transport aircraft, for example, created by Soviet scientists, designers, and workers, is capable of hauling 150-ton oversize

loads great distances. At the Paris Air Show in the summer of 1985 it was acknowledged not only as the world's largest but also the most advanced.

One can take pride in the achievements of Soviet scientists in the fields of mathematics and mechanics, thermonuclear synthesis, quantum electronics, and biology. On the whole there have been highly promising developments in the USSR in every scientific and technical field.

At the same time the party points out that today one should consider the tasks of accelerating the pace of scientific and technological advance through the prism of the demands of the time, the demands of a decisive turn by science toward the needs of societal production and by production toward science. Questions pertaining to strengthening all links of the chain joining together science, technology, and production were analyzed from these positions at the conference at the CPSU Central Committee.

Search for and mobilization of all reserve potential for increasing production efficiency and product quality have been defined as the principal direction to take in this multifaceted effort. These issues are reflected in the basic directions of economic and social development of the USSR in the 12th FIve-Year Plan and up to the year 2000.

This country's leading industrial regions and branches display an example of conscientious economic management. The USSR aircraft industry is among the leaders in the area of increasing production efficiency. Implementation of programs to speed up scientific and technological advance in this branch of the economy will, in particular, ensure on new passenger aircraft which will enter service during the 12th Five-Year Plan a doubling of fuel economy and half again the engine service life and reliability in comparison with aircraft currently being manufactured.

In the estimate of the CPSU, machine building plays a key role in accomplishment of the scientific and technological revolution. There has already been formulated the task of boosting the machine building industry's growth rate by 50 to 100 percent in the 12th Five-Year Plan. The adopted strategy is maximally to utilize existing capacity and to accomplish renovation and reconstruction of this industry on a priority basis. To accomplish this, capital investiment in machine building is to be increased by a factor of 1.8-2 through partial redistribution of funds, with a sharp increase in the volume of manufacture of modern types of equipment.

Microelectronics, computer technology and instrument engineering, as well as the entire information science industry, which are especially important for aviation technology, are rightly called a catalyst of advance within this equipment area. These fields will be given accelerated development. Attention has been focused on the fact that a great deal depends not only on increasing computer manufacture but also on skilled utilization of computers in all branches and domains.

Today's combat, for example, has become not only a contest of fire but of information as well. The volume of information which an officer must consider and process has grown immeasurably. This is due to a broadening of the scale

of troop teamwork and coordination, increasing complexity of combat hardware, and a substantial increase in the intensity and scale of combat operations. It is impossible for a commander to accomplish command and control tasks in these conditions without extensive employment of electronic computers. It is also important to remember that increasing the computer literacy of the personnel of air-force line units serves as a major reserve potential for improving the performance and accuracy characteristics of new-generation aircraft.

The party notes that the front line of the campaign for acceleration of scientific and technological advance runs through science. Priority significance in this area is attached to the development of basic science, which serves as a generator of ideas, opens up breakthroughs into new fields, and enables us to advance to new levels of efficiency. The USSR Academy of Sciences occupies a central position in the development of basic research.

At the same time science at higher educational institutions possesses considerable reserve potential, potential which is not being fully utilized at present. According to current estimates, our higher educational institutions could increase the volume of scientific research activities by a factor of 2-2.5.

This party demand also applies in full measure to scientific personnel at Air Forces educational institutions. High-quality upgrading of aircraft and weapons and a steady increase in their combat capabilities are enhancing the role and significance of air in modern operations and require new innovative inquiry and basic research in the area of its combat employment.

The volume of scientific research being conducted at Air Forces military higher educational institutions, and in particular at the Order of Lenin and the October Revolution Red-Banner Military Air Engineering Academy imeni Professor N. Ye. Zhukovskiy. In recent years approximately 360 patent applicatons have been submitted, and certificates of invention have been issued on more than half of these. Almost 70 percent of scientific research performed in the last 3 or 4 years has already been implemented in Air Forces units and industry. During this same time four basic textbooks covering a number of major areas of military aviation science have been prepared and published under the scientific guidance of academy scientists.

Military life, however, is constantly advancing new and more complex problems, which must be comprehensively resolved. And the academy devotes considerable attention to this question. Its staff members have been assigned the task of bringing science and practical activities closer together. The academy has a large team of highly-skilled scientific cadres who are capable of successfully accomplishing their assigned tasks.

Specific directions of development of scientific research include the search for ways to achieve further increase in the combat readiness of aviation units and combined units, their technical equipment, new modes of engaging hostile air and ground forces in conditions of employment of nuclear and conventional weapons, and development of measures to ensure high survivability of aircraft

systems in conditions of enemy mass employment of homing weapons, reconnaissance-strike systems and electronic warfare.

The innovator movement is expanding year by year in the Air Forces. Every year aviator-inventors submit thousands of applications to register inventions and efficiency innovation proposals, utilization of which promotes further increase in the combat readiness of units and subunits. Graduates of the Military Air Engineering Academy imeni N. Ye. Zhukovskiy display an example of technical creativity and innovation. These people include officers V. Aleksandrov, N. Kostin, V. Shevtsov, and many others.

It would take some time to list all the technical innovations which have been suggested by Honored Inventor RSFSR officer-aviator G. Shelikhov during his years in the service. He has authored more than 20 inventions and proposed an aggregate of devices making it possible to determine with a high degree of accuracy the state and condition of critical aircraft components and assemblies. Many of this officer's innovations are widely employed in line units, at repair and overhaul enterprises of the Ministry of Defense, and in various branches and sectors of the nation's economy.

Line-unit inventors are also capable of taking part in solving such an important problem as automation of troop command and control. Air-force efficiency innovators are giving increasing thought to the matter of improving the effectiveness of utilization of electronic computers, communications equipment and warning systems. A large arena of inventor activity involves improving training facilities, training simulator equipment, designing and building new equipment, instruments, and tools making it possible to improve the quality of aircraft servicing, maintenance and repair.

In short, military inventors and efficiency innovators have plenty to do. The contribution they make is quite substantial. For example, just at enterprises and organizations of the USSR Ministry of Defense operating on the basis of cost accountability, savings from the adoption of inventions and efficiency innovation suggestions are running 40 million rubles annually.

The party correctly considers cadres, particularly engineer-technician and scientist personnel, as a decisive factor in accelerating scientific and technological advance. Measures aimed at increasing public recognition of scientific and engineering labor and increasing innovative elements in this labor are being actively and vigorously elaborated in this country.

Meriting attention in this connection is a discussion, being conducted on the pages of this journal, of an article by Maj Gen Avn A. Grishin entitled "Squadron Engineer, What Should He Be?", which appeared in the November 1984 issue. The authors of discussion response articles primarily stress the great importance of the professional competence of the military specialist. New aircraft systems, with extensive employment of cybernetics, electronics, and modern weaponry, impose greater demands on an engineer's proficiency. Effectiveness of employment of an aircraft system, flight safety, and economy of resources depend in large measure on his degree of mastery and knowledge of the equipment.

The military engineer should act as an organizer of consummate mastering of new aircraft systems. To accomplish this he must be particularly well informed in matters pertaining to scientific and technological advance and must work with an eye to the future.

These qualities are in full measure characteristic of aviation engineer leader-Communist officer G. Fetisov. He possesses profound and thorough knowledge of the construction and design of airframe and powerplant, weapons, controls, flight and navigation instruments, automated control systems, as well as guideline documents specifying the rules and regulations pertaining to operation and maintenance of a given type of aircraft. The aviation engineer service supervisor conscientiously seeks to ensure observance of technical and maintenance requirements and displays an example to his men in this important matter. Competence, integrity, and party-minded demandingness enable him correctly to organize the process of training and indoctrination of aviation personnel. An atmosphere of innovation and businesslike efficiency and strong resolve to greet the 27th CPSU Congress with new achievements in military labor prevail in the collective he leads.

It was noted at the conference at the CPSU Central Committee that acceleration of scientific and technological advance is a vitally important thing, which is in conformity with the interests of the entire Soviet people. It is also dictated by our country's defense needs. The Soviet Union will continue in the future applying maximum effort to halt the arms race. In the face of an aggressive policy and threats by imperialism, however, it cannot permit the latter to achieve military superiority. This is the will of the Soviet people. Acceleration of scientific and technological advance is the principal instrument for achieving successful accomplishment of the ambitious undertakings and plans with which the party is advancing toward its 27th Congress.



3024
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AVIATION PERSONNEL URGED TO BE VANGUARD PERFORMERS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 24-25

[Article: "Measuring Performance Against the Leaders"]

[Text] This year, a year of preparations for the 27th CPSU Congress, the attention of aviation personnel is riveted on right-flanker socialist competition. And this is understandable, for their experience and know-how is becoming a priceless asset of all and is making it possible sharply to accelerate movement forward.

Everybody is measuring his performance against that of the performance leaders. It is difficult to be at the forefront at all times, to produce consistently high results in combat and political training, but this is essential: the daily life and work of vanguard aviation personnel represent a systematic search for new, more effective modes and methods of accomplishing the tasks assigned by the Communist Party and Soviet Government pertaining to safeguarding the peaceful labor of the Soviet people. This is a struggle for each and every second, for excellent performance of each and every exercise. Today's socialist competition vanguarders are men of indomitable eagle's flight, continuers of fine fighting traditions, and the pride of the Soviet Air Forces.

For aviation personnel who are party members, to play a vanguard role means to be active champions of CPSU policy, to serve as an example of a communist attitude toward military labor, to be a pioneer in all new and progressive innovations, to master modern aircraft systems, to raise one's proficiency rating, and to inspire one's fellow servicemen to campaign for strengthened discipline and further increase in the combat readiness of subunits and units.

The ranks of vanguard performers are growing, for truly to carry out party obligations means being responsible not only for oneself but also for the state of affairs with one's neighbor, to concern oneself with successfully accomplishing the tasks facing the collective as a whole.

It is the duty of aviation personnel to achieve complete, prompt and timely fulfillment of pledges in socialist competition to honor the 27th CPSU Congress in a worthy manner. And there is no doubt that this task will be successfully accomplished.



3024
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LONG-RANGE BOMBER OPERATIONS IN WORLD WAR II

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 26-27

[Article, published under the heading "War Heroes on Air-Force Tactics," by Hero of the Soviet Union Honored Military Pilot USSR Col Gen Avn V. Reshetnikov: "Against Operational and Strategic Targets"; second part of two-part article, first part appeared in No 10, 1985]

[Text] Substantial changes took place in long-range aviation toward the beginning of 1943. The Soviet aircraft industry was picking up the pace of aircraft production, which was directly reflected in an increase in the number of aircraft in long-range bomber units. ADD [Long-Range Aviation] now totaled 11 divisions, equipped for the most part with Il-4, Pe-8, and Yer-2 aircraft, the considerable combat radius and effective bomb armament of which enabled them to deliver heavy strikes on enemy targets at operational and strategic depth.

Bomber corps began to be formed, based on aircraft divisions, in May 1943, pursuant to a decree issued by the State Defense Committee. A total of 8 aviation corps were formed, totaling more than 800 aircraft. The force level was to be boosted to 1,200 aircraft, however.

Possessing considerable experience in flying strikes on targets deep behind enemy lines and at immediate operational and tactical depth, Long-Range Aviation, under the direction of Hq SHC [Headquarters, Supreme High Command], began mounting air operations for the purpose of destroying fascist Luftwaffe forces on the ground, destroying operational reserves, and disrupting troop movements. Operations conducted jointly with Frontal Aviation required of the command authorities extremely precise organization of teamwork and coordination and distribution of efforts by place and time. In the course of the Soviet counteroffensive at Stalingrad, for example, ADD combined units, working in coordination with aircraft of the 2nd, 8th, 16th and 17th Air armies, acquired initial experience in taking part in an air offensive.

The command authorities devoted considerable attention to ADD participation in the battle for air supremacy. This was manifested particularly vividly during the Battle of Kursk. With the aim of weakening opposing air forces, Hq SHC decided to mount an operation on a broad front. The forces of three

additional air armies were enlisted to take part in this operation. During the night of 8 June massive bombing strikes were flown against several airbases at which a large concentration of Hitlerite aircraft had been spotted. A total of 302 long-range bombers operated against airfields at Seshcha, Bryansk, and Orel alone. Large groups of bombers bombed these airfields repeatedly in the course of the two succeeding nights. As a result the enemy sustained enormous losses.

Fairly often ADD operated in large forces in sectors designated for breakthrough of the enemy's defense. For example, 5 aircraft corps and 1 separate aircraft division were concentrated for strikes on enemy troops in the tactical zone. During the period of preparation for the battle on the Kursk Salient, long-range bombers hit rail centers and yards to a depth of up to 600 kilometers in the months of April, May, and June.

During that same period effective strikes were delivered on long-range artillery positions of the enemy force in the vicinity of Leningrad, artillery which was shelling the city. Following Soviet bomber strikes, the Hitlerites would cease shelling Leningrad for 10-12 days. Frequently bomber crews would fly two different missions in a single night: a first mission to Bryansk, for example, and a second to the Leningrad area.

The Long-Range Aviation command authorities endeavored not to scatter bomber forces but to fly target strikes with large groups of bombers. For the most part they employed concentrated airstrikes in corps-size groups of 80-100 aircraft, with massed strikes flown less frequently and only against particularly important targets. Strikes in waves would be flown in the intervals between massed and concentrated strikes, as a rule for the purpose of disrupting troop movements by rail and highway, preventing repair activities in transportation centers, as well as against troops at points of troop concentration. Eight aviation corps and 1 aviation division operated just against rail centers and railyards during the period of the Belorussian Operation. Large forces flew strikes on a limited number of targets. On a single night not more than 4 rail centers would be attacked, and not more than 3 ports in coastal areas. During the night of 5 June 1944, for example, 6 aviation corps -- 525 bombers -- flew a bombing strike on the Kishinev rail center, while on the following night 537 bombers took part in a raid on the Iasi rail center.

In October 1944 the Baltic seaports of Libava and Memel were hit on five occasions by massed strikes. The heaviest strike was flown on Memel during the night of 14 October by 4 bomber corps totaling 320 aircraft.

Long-range bomber strikes on enemy lines of communication played an important role in thwarting the Fascist command authorities' plans to redeploy troops on the Kursk Salient and to maneuver reserves during an offensive by Soviet forces on all fronts.

Night "hunter" activities came into widespread use during the war. As a rule from 2 to 4 aircraft manned by highly-proficient aircrews would go out, while less frequently individual aircraft would fly such missions. The "hunters" or rovers would fly along rail lines and attack trains out on the line and bomb

railyards. In July 1944, for example, five bombers smashed 30 trains carrying enemy equipment and troops, damaged 20 locomotives, and demolished railyard buildings and a railroad station. During the Vistula-Oder Operation rovers destroyed 5 trains in 2 nights on the rail line between Moravska Ostrava and Krnov. As a result lines of communication operated with interruptions, military supply was disrupted, and the enemy suffered casualties and equipment losses.

During front offensive operations Long-Range Aviation was employed to hit targets at tactical and immediate operational depth in the enemy's defense. Immediate air preparation, in which ADD bombers and Frontal Aviation night bombers took part, would be conducted just prior to commencement of a Soviet offensive. Efforts would be distributed by targets and time. In the Belorussian Strategic Offensive Operation, for example, in the zone of the First Belorussian Front, on 24 June ADD combined units worked the enemy's second defensive zone from 2400 to 0230 hours, while night bombers of the air armies worked the main defensive zone from 0230 hours and delivered strikes up to dawn. ADD combined units operated in mass on the main axis of advance. For example, 3 aviation corps bombed targets in the zone of advance of the 11th Guards Army of the Third Belorussian Front, while 3 other corps were bombing targets in the zone of advance of the 49th Army of the Second Belorussian Front.

At the same time long-range bomber crews were also flying frontal bomber missions, that is, were hitting targets in the immediate vicinity of friendly forces.

On the night of 23 June 1944, for example, just prior to commencement of the Vitebsk, Orsha and Mogilev front offensive operations, ADD was assigned the mission to fly heavy bombing strikes on enemy defensive positions 1,000-1,200 meters from Soviet lines. Exceptionally precise organization of guidance of long-range bombers and target designation was required under these conditions. In preparing for the mission, aircrews carefully calculated their routes, figuring in reported winds aloft and bomb load. Considerable attention was devoted to auxiliary ground navigation aids. Light and radio beacons were used for this purpose. Troops marked their forwardmost positions with signal flares and tracer rounds. Illuminated corridors, marked with truck headlights, bonfires, and pyrotechnic devices, as well as serachlight beams directed toward the enemy helped guide aircrews to the target. Well-planned organization of coordination between ground troops and long-range bombers helped them successfully accomplish their missions.

Beginning in the spring of 1944, in addition to immediate air preparation, Air Forces command authorities also employed preliminary air preparation, in which ADD combined units took part. This was manifested particularly distinctly in the concluding phase of the war. For example, when military operations moved onto the soil of Fascist Germany and its satellites, and targets which previously had been far behind the enemy lines were now within the range of frontal bombers, it became possible to enlist air strike forces to soften up a particularly strong enemy defense and to destroy the enemy's citadels and fortified areas. At this time Long-Range Aviation was redesignated the 18th Air Army and placed under the commanding general of Red Army Air Forces, while

retaining its tasking designation as an asset of the Supreme High Command. Long-range bombers began performing frontal aviation missions in close coordination with ground forces and other air components. Aircrews had to adapt to operations in different conditions and to acquire new skills. For example, they began flying daylight missions fairly frequently, hitting small as well as hardened targets with heavy bombs, and working in coordination with fighter cover. This unquestionably made a particular imprint on all aspects of the combat activities of long-range bomber crews, and particularly their moral-psychological preparation.

During the East Prussian Operation, two days prior to the assault of Koenigsberg, long-range bombers took part in preliminary air preparation. A total of 766 sorties were flown to hit the stronghold city's strongpoints, forts, and artillery positions. During the day on 7 April 1945, a massed airstrike was flown just prior to the assault. A heavy fighter screen was set up on the approaches to the city. More than 100 Soviet fighters patrolled aloft. A total of 514 long-range bombers, under the direct escort of 124 fighters, delivered a formidable strike with heavy bombs, which significantly diminished the fascists' ability to resist and promoted a more rapid advance by Soviet ground forces.

The Berlin Offensive Operation holds a special place in the employment of long-range bombers during the Great Patriotic War. Shortly before dawn on 16 April 1945, 745 long-range bombers delivered a massive airstrike on strongpoints in the enemy's second defensive zone. On the night of 17 April 760 bombers flew another massive raid on enemy targets in the zone of advance of Soviet forces. Subsequently, due to adverse weather, aircrews were forced to shift to actions in waves, flying in subunit-size elements. But these were the last airstrikes on fascist strongpoints on the approaches to Berlin and within the city proper. During this period a wealth of experience was gained in delivering airstrikes in conditions of heavy opposition by antiaircraft artillery working in coordination with searchlights and night interceptors carrying onboard radars.

The tactics and combat employment of long-range bombers, especially night tactics, were being constantly improved and perfected as the war advanced. New ways and methods were being sought to ensure a high degree of effectiveness of target engagement. Weather and target reconnaissance aircraft, target locating and illumination groups, strike groups, strike result monitoring and photography aircraft were incorporated into the regiment and division formations. As a rule up to 70 percent of the total number of bombers would come in on the strike wave. Enemy antiaircraft defense suppression groups would also be designated, which prior to the approach of the main strike force would knock out searchlights and antiaircraft weapons on a priority basis with bombs and machinegun fire. Frequently airfield-isolator aircraft would be sent out prior to strike group departure. These aircraft would hit the airfields at which the aircraft were based which defended the strike targets, dropping bombs onto the runways and preventing fighters from taking off. Maximum airstrike density would be achieved with thorough, detailed preparation.

When a target was heavily antiaircraft-defended, converging attacks would frequently be employed, where bombers would run on the target from different directions and at different altitudes. In these instances the enemy would be forced to disperse his antiaircraft fire. The bomber crews in turn would endeavor to initiate their bombing run at higher airspeeds, when searchlight beams and antiaircraft fire were concentrated on other aircraft. Frequently another technique would also be employed: aircraft would fly a descending approach to the target with engines throttled back or desynchronized, in order to fool the sound locator crews. Every long-range bomber pilot would adapt to the prevailing conditions and had ready in his tactical arsenal various maneuvers and devices for evading enemy antiaircraft fire, searchlight beams and night fighters.

Strikes on targets deep behind enemy lines and close to the line of contact possessed specific features and required very thorough mission preparation by bomber crews and precise organization of teamwork and coordination with ground forces as well as a high level of navigation support. Expansion of the network of light and radio beacons, direction finder stations and radio beacons appreciably improved the quality of bomber navigation and accuracy of arriving at the target and increased the effectiveness of bomber activities. In strikes deep behind enemy lines, navigators made extensive use of star tracking and local radio broadcast stations. During operations at tactical depth in support of a front's forces, a representative from ADD (subsequently the 18th Air Army) headquarters would be assigned to the command post of the commanding general of the front and would coordinate all matters arising pertaining to preparation for and delivery of a strike.

Long-range bomber crews flew approximately 220,000 combat missions during the Great Patriotic War. More than 40 percent of these missions involved operations against enemy troops and combat equipment on the battlefield. A similar figure applied to targets at operational depth, including missions to disrupt rail traffic and strikes on airfieds and other important targets. Approximately 4 percent of sorties were flown against strategic targets deep behind enemy lines (up to 8 percent or more in the period 1942-1943).

Combat employment of long-range bombers during the war indicated that this was the most highly-maneuverable and long-range combat asset at the disposal of the Supreme High Command. Heroism on the part of Long-Range Aviation personnel and their contribution to the defeat of German fascism were greatly appreciated by our people, the Communist Party and Soviet Government. Five bomber corps, 12 bomber divisions, and 43 bomber regiments were redesignated guards units. Seven bomber divisions and 31 bomber regiments were decorated. More than 20,000 aviators were awarded medals and decorations. Approximately 250 persons were named Hero of the Soviet Union. A. Molodchiy, Ye. Fedorov, P. Taran, S. Kretov, V. Osipov, and V. Senko were twice awarded this title.

The experience of long-range bomber combat operations in the war years is of unfading significance for combat training of aviation personnel of the present

generation. It contains outstanding examples of the highest degree of courage, heroism, self-sacrifice, and professional expertise on the part of specialists of all categories and of boundless love for the socialist homeland.



3024
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WIND SHEAR ON LANDING APPROACH CAUSES NEAR-MISHAP

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 28-29

[Article, published under the heading "Constant Attention to Flight Safety," by Military Pilot 1st Class Capt A. Ziziko: "Dangerous Phenomenon During Landing"]

[Text] Col N. Mitrofanov was checking Capt M. Karmishkin's flying technique. The pilot had done an excellent job of performing the assigned sequence of maneuvers in the practice area and, returning to the field, was on final approach. Remembering that the landing is the most critical element of a flight, the captain precisely held the specified parameters. Upon reaching the outer compass locator, he performed the required cockpit procedures and changed to the throttle setting recommended by the weather reconnaissance pilot at the preliminary briefing session.

"Outer marker inbound," Karmishkin radioed the tower.

"Cleared to land, headwind, 6-7 meters per second," the tower responded.

The aircraft approached the runway precisely on glideslope. The instruments indicated that everything was as it should be, and the instructor did not intervene. The airspeed indicator needle was behaving somewhat strangely. Its fluctuations back and forth within a range of 5-10 km/h indicated turbulence in the ground-adjacent air layer, and the pilot in response maintained indicated airspeed 10-15 km/h above normal landing approach speed.

Nothing indicated a problem. But as he approached the middle compass locator, the pilot noted an abrupt (within 2-3 seconds) drop from 310 to 280 km/h indicated, with a subsequent increase in rate of sink. The fighter suddenly began dropping rapidly. Karmishkin instantly responded by applying full throttle. This was followed by a command from the tower repeated three times: "Advance throttle; go around!"

The engine proceeded to develop maximum power, and the dual trainer, assuming a high angle of attack, proceeded to rise. On his second try Karmishkin compensated for the encountered conditions and, maintaining airspeed at 20-30

km/h above normal at the check points, landed the aircraft without further incident.

As we can see, as they were on their final approach, airspeed dropped dangerously, taking the pilots completely by surprise. If Karmishkin had not responded promptly to the situation, serious consequences could have ensued.

This phenomenon is not encountered often during flight operations, but I feel that we should analyze it in detail and ascertain the causes of this phenomenon which can threaten flight safety. So-called "wind shear" was discussed in this journal in an article entitled "Wind Shear, Its Causes and Consequences" by Lt Col D. Finogeyev (AVIATSIYA I KOSMONAVTIKA, No 2, 1982).

In practice air masses are taken as a frame of reference, since a pilot flies his aircraft at a speed relative to airflow Vnp (Vuct, Mach number). Specific values are specified in manuals, in flight diagrams, and in other documents. With a change in the velocity of movement of air masses in the boundary layer, they can no longer constitute an inertial frame of reference. During maneuver adjacent to the ground the dU/dH gradient is considerable, while quantity Vy is relatively large. With an initial equilibrium of tangential forces one can assume that a slight difference in these forces with a change in Vnp cannot seriously affect recovery of indicated airspeed, due to brief time of effect. Therefore, when tangential forces are equal, an aircraft will move relative to the ground at a constant speed Vk, while speed will change relative to air masses in this layer (Figure 1).

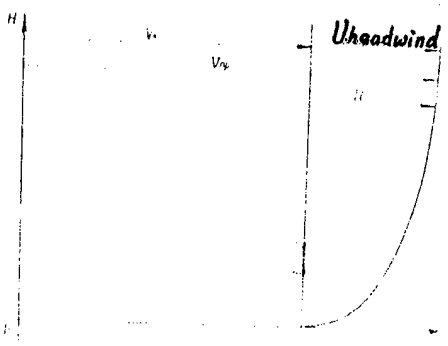


Figure 1. "Classic" wind model.

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If indicated airspeed drops, the pilot increases engine thrust. In this instance engine rpm will differ not only from the prescribed throttle setting in no-wind conditions but also from that whereby wind velocity would be constant with altitude. That is, additional engine thrust is required to regain "lost" speed. Experienced pilots, correlating the trend and magnitude of change in airspeed on final approach descent with required engine thrust, distinguish "dense wind" and "nondense wind."

The term "air density" is used in aerodynamics. It should not be confused with the term "wind density," which appeared as a result of the purely

practical activities of flight personnel. One can conclude that wind density is nothing other than speed-altitude gradient.

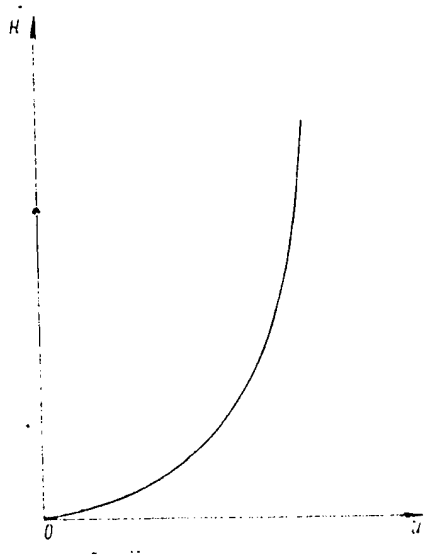


Figure 2. "Classic" wind model in ground-adjacent air layer.

Meteorology has presented us with several models of wind in the ground-adjacent layer. One of them, the so-called classic model, is shown in Figure 2. In the conditions of "classic" wind models, with a small dU/dH value there occurs a comparatively slow change in indicated airspeed, without sign reversal. It can be determined in some measure from an aircraft's behavior in the process of flying close to the ground (H=20-30 m), as already stated. At this phase the pilot shifts to flying visual, and it is precisely here that the most intensive wind velocity change takes place.

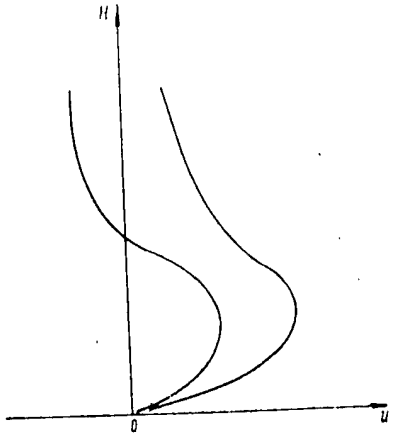


Figure 3. "Non-classic" wind model in ground-adjacent air layer.

Figure 3 contains models of nonclassic wind profiles, which have been practically confirmed. In these conditions it is much more difficult for the pilot to maintain the required flight parameters, since it is necessary substantially to increase the number of work motions.

In a critique of flight operations involving flight data recorder tapes, the pilot is criticized for making frequent throttle changes on his landing approach. I feel that this accusation is not always fair, since throttle adjustments may be dictated by an endeavor to compensate for change in Vnp due to change in wind velocity with decreasing altitude.

In the case under analysis, we shall examine on SARPP-12 flight data recorder tapes landing approach segment BC (Figure 4), on which altitude decreased by DeltaH=90 m in Delta t=27.56 seconds prior to the dangerous drop in airspeed. For this segment we can calculate average wind velocity u-cp in the specified altitude range. Comparing the aircraft's rate of descent in this specific instance with Vy when descending in no-wind conditions (Figure 5), we can calculate average wind velocity u-cp:

$$\sin\Theta = \frac{V_{y_{u=0}}}{V_{cp_{БС}}};$$

$$\sin\Theta = \frac{V_{y_{u\neq 0}}}{V_{cp_{БС}} - U_{cp_{БС_x}}};$$

$$\frac{V_{y_{u=0}}}{V_{cp_{БС}}} = \frac{V_{y_{u\neq 0}}}{V_{cp_{БС}} - U_{cp_{БС_x}}},$$

whence:

$$U_{cp_{БС}} = V_{cp_{БС}}\left(1 - \frac{V_{y_{u\neq 0}}}{V_{y_{u=0}}}\right).$$

Вследствие малости $\Theta$ можно считать:
$V_x - U_x = V - U$.
На участке БС $V_{cp_{БС}} = 320$ км/ч:

As a consequence of the triviality of Theta, we can assume: V-Ux=V-U.

On segment BC VcpBC=320 km/h;

$$U_{cp_{БС}} = V_{cp_{БС}}\left(1 - \frac{\frac{\Delta H_{БС}}{\Delta t_{БС}}}{V_{cp_{БС}} \sin 2°40'}\right);$$

$$U_{cp_{БС}}' = 88{,}9\left(1 - \frac{\frac{90}{27{,}56}}{88{,}9 \cdot 0{,}046525}\right) =$$

$$= 18.7 \text{ m/s}$$

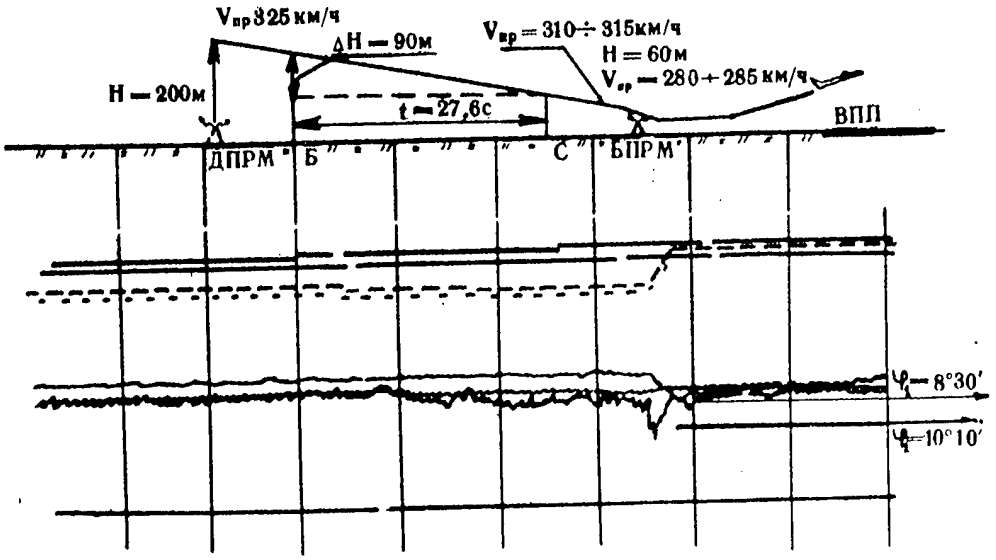


Figure 4. Diagram of landing approach and go-around by aircraft of Capt M. Karmishkin.

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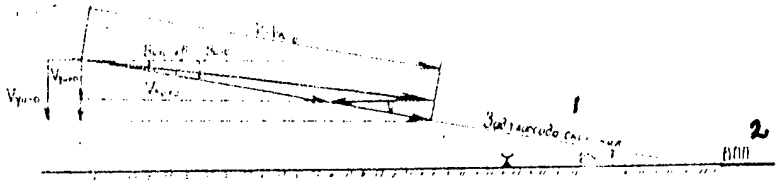


Figure 5. Diagram of aircraft landing approach.

Key: 1. Prescribed glidepath; 2. Runway

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According to the weather data, surface wind velocity (H=8-9 m) was u=6-7 m/s. Thus the difference in wind velocities at the surface and at a height of 100 meters was

$$\Delta U = U_{H-100} - U_{H-8-9} =$$
$$= 18{,}7 - 6{,}5 = 12{,}2 \text{ м/с} \approx 44 \text{ км/ч}.$$

This is one of the proposed methods of determining wind velocity from flight data recorder tape analysis. It prescribes aircraft movement relative to the ground surface precisely along a prescribed glidepath (for example, in

automatic mode). Error in determining u-H will depend to a significant degree on the accuracy of H, V, and t provided by the flight data recorder tapes.

Wind shear can be estimated more accurately from the stabilator deflection angle recording track in conjunction with parameters n-y, n-x, and engine rpm. With a specified aircraft weight, center of gravity and aerodynamic characteristics, there is an unambiguous relationship, determined by trim diagram (Figure 6).

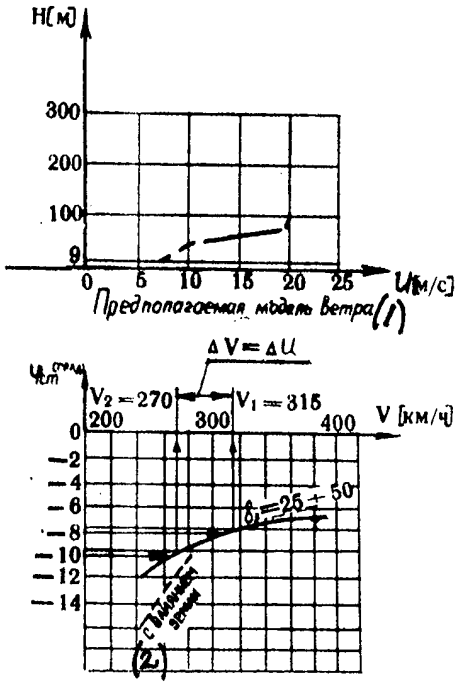


Figure 6. Stabilator trim deflections in landing approach conditions.

Key: 1. Assumed wind model; 2. With ground effect

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In view of the fact that on landing approach descent the trajectory angles are comparatively small, they practically coincide with level flight at speeds close to minimum.

Small differences in mass characteristics and prescribed engine operating conditions make it possible to utilize certain trim diagrams for analysis.

It is evident in figures 4 and 6 that in t=3 seconds the stabilator trim deflection angle increased from 8 degrees 30 minutes to 10 degrees 10 minutes. This corresponds to a drop in airspeed from 315 to 270 km/h which, with stable angle of descent (determined by constancy of normal load factor n-y) and engine rpm, can occur only when wind shear is present. The normal rate of airspeed drop on this segment of the landing approach descent is dV/dt=0.58

km/h/s, and in 3 seconds airspeed should have decreased by only Delta V=1.75 km/h.

On the basis of the post-mission analysis, pilot statements, the flight data recorder tapes nad calculations, one can conclude that a very severe wind shear was the cause of the dangerous incident on final approach which required a go-around.

With the proposed method one can analyze more thoroughly the effect of wind on the process of flying an aircraft on a landing approach.



3024
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DANGER TO AIRCRAFT FROM CLOUD ELECTRICAL-DISCHARGE STRIKES EXPLAINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 32-33

[Article, published under the heading "Recommendations of Science Into Practical Training and Instruction," by Candidate of Geographical Sciences Col D. Finogeyev: "Warning: Electrostatic Charging!"]

[Text] In recent years electrostatic charging of airborne aircraft has firmly taken a position in the ranks of phenomena hazardous to aviation. This process per se does not create serious difficulties for aircrews, although it sometimes causes certain disruptions in the operation of communications gear and some navigation instruments. The hazard is caused by aircraft being struck by cloud electrical discharges, caused by the presence of electrical charges on aircraft. Most frequently such strikes occur in clouds where no lightning was observed prior to the aircraft's appearance. Such incidents present a particular hazard, since strikes take the aircrew by surprise, which sometimes leads to aircrew errors and creates a difficult situation.

It is generally believed that electrical discharges in clouds not associated with thunderstorm activity are initiated by the aircraft. This phenomenon consists essentially in the following. Under certain conditions of weather, an electrical field intensity is created in clouds other than thunderstorm cells, a field strength sufficient to support an already initiated electrical discharge. Local zones of elevated intensity are created against the background of such a field, under the influence of processes of convection, phase transformations of cloud particles, and turbulence. When an electrically-charged aircraft enters such a zone, the electrical fields of the cloud and aircraft begin to interact, as a result of which the intensity of the combined field may be sufficient for initiation of discharge.

The resulting cloud electrostatic discharge will with certainty strike the aircraft. It usually strikes those parts of the aircraft where the greatest charge accumulates, determined by the correlation between charge and discharge currents.

Charge currents chiefly involve the interaction of cloud and precipitation particles with the aircraft's surface. The greater the velocity of particles at the moment of impact on the aircraft's surface and the smaller their size,

the larger the currents. They are also dependent on the phase state of the cloud particles and the material of the aircraft's surface. Electrostatic charging takes place more intensively during flight in clouds and precipitation, the particles of which are in a solid phase state, and if there is ice buildup on the surface of the aircraft. Those parts of the aircraft made of dielectric and composite materials, as well as surfaces coated with certain types of decorative protective varnishes and enamels, become particularly heavily charged.

Discharging of an aircraft takes place primarily by detachment of charged particles from its surface and the corona discharge current flowing through the arresters placed at wing and tail tips. As operating experience with modern aircraft indicates, however, they do not always fully protect against electrostatic charging.

Frequently glowing occurs during flight around aircraft parts and components on which a heavy charge accumulates. It is observed particularly frequently around radar antenna fairings. Sometimes the glow assumes the form of a sphere, perceived by the crew as ball lightning. The glow as a rule is of brief duration, local in nature, and disappears following discharge. There has been a documented instance, however, where it spread over the entire forward part of the fuselage of a fighter-bomber, penetrated the cockpit, and covered the instrument panel. Discharges, in the form of streamers (narrow glowing channels), struck the pilot, leaving point burn marks on his body. The glow caused the pilot temporary loss of vision. As a result he was forced to eject. The aircraft was encompassed in a light-blue glow up to the point of impact with the ground.

Cloud electrical discharges striking an aircraft frequently damage antenna fairings and knock avionics out of commission. When a discharge strikes points close to an engine air intake, the compression shock which occurs leads to airflow disruption, surging, and engine flameout. If the aircraft is too low to accomplish a restart, the crew must abandon a perfectly good aircraft.

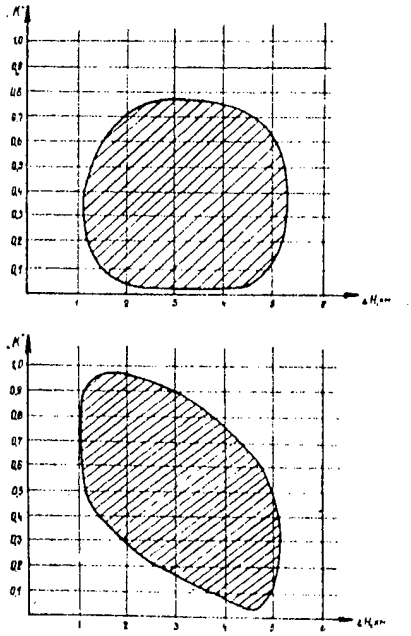
THe following incident occurred in winter at a coastal airfield. The weather during flight operations was affected by the tail end of an area of low pressure. Cloud cover in the vicinity of the airfield was broken stratocumulus, with cloud bases at 300 meters and cloud tops for the most part at 2,000 meters. From time to time wet snow would fall, dropping visibility to 4 km. Ambient air temperature at the ground surface was approximately 0 degrees Celsius.

Night flight operations were winding up when the approach controller reported that a fighter on landing approach had disappeared from the radar between the outer and middle compass locators. At that same time, it was later learned, light-blue and orange flashes had been observed one after the other in the vicinity of the outer compass locator.

An investigation established that as the aircraft was on its approach descent, at an altitude of about 400 meters a light-blue glow, growing in size, appeared under the aircraft. Discharge then occurred. The cockpit instrument lighting failed for an instant. The engine shut down. Since he was at low

altitude, the pilot made the only correct decision under the circumstances -- to eject.

Interviews with aircrews established that electrostatic charging was not observed in clouds at high altitudes. At lower altitudes, however, streamers appeared on the cockpit canopy when the aircraft was in thick clouds, while general static and crackling sounds could be heard in the radio headset -- signs of intensive electrostatic charging.



The greatest frequency of instances of aircraft taking lightning strikes in stratiform (a) and cumuliform (b) cloud cover in relation to its thickness (Delta H) and magnitude of parameter K.

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We should note that signs of intensive electrical charging are observed fairly frequently during flight, but an aircraft is not always struck by an electrical discharge after such signs appear. This occurs if certain weather conditions are present, which should be evaluated on the basis of determination of a number of indications. These include the presence of clouds of one of the following types in the flight operations area: stratocumulus, nimbostratus, towering cumulus and cumulonimbus; passage of fronts (except for warm fronts), tail end of a low-pressure area, shallow-gradient field of low and high pressure, warm sector of a low-pressure area. The latter indications are determined from a surface weather map. In addition, one must bear in mind that the temperature contrast at ground level in a cold-front zone should not exceed 5 degrees/500 km with a rate of front movement not greater than 40-50 km/h. At surface barometric pressure of 850 millibars one usually observes the tail end of a cyclonic airmass, an area of

low pressure, a low-pressure area warm sector, a low-pressure trough, and a diffuse field of elevated pressure.

Another indication of the presence of zones of intensive electrostatic charging in clouds is entry into a region such as that indicated in the figure, for stratiform and cumuliform cloud cover. The coordinates of points on the graphs are determined by cloud vertical development values Delta H and parameter K, which is calculated with the following formula:

$$K=H-5 \text{ degrees} - Hng/Hvg - Hng,$$

where H-5 degrees is the altitude of the -5 degrees C isotherm; Hng and Hvg are the height of cloud bases and tops.

When using the graph in the figure, one should bear in mind that for nimbostratus cloud cover, its vertical thickness should exceed 2 km.

A conclusion that conditions exist whereby an electrical discharge strike is possible in clouds without thunderstorm activity is reached if all indicators are present. In order to take precautionary measures, however, it is necessary not only to be aware of the possibility of an electrical discharge strike but also to possess information on the spatial position of zones where this phenomenon is to be expected. It is recommended that radars be used for this purpose.

These zones are recognized as areas of increased brightness on weather radars (vertical columns on IDV display, individual cells for clusters on plan position indicator), in which maximum reflectivity lgZ exceeds 1.0 for a nimbostratus and altostratus cloud system and exceeds 0.5 for a stratoculumus cloud system.

With airfield radars, zones are determied by the presence of bright areas of medium-intensity and high-intensity precipitation on the displays of radars operating in precipitation detection mode.

In determining altitudes of zones of potential electrical discharge strike, one should bear in mind that it takes place most frequently at temperatures of from 0 to -10 degrees C in the lower half of nimbostratus-altostratus and the upper half of stratocumulus cloud development.

In order to prevent aircraft from electrical discharge strikes in nonthunderstorm clouds, when the weather situation is favorable for the occurence of this phenomenon, flight operations officers should not allow aircraft to enter bright areas observed on radar displays. When signs of intensive electrostatic charging appear, it is recommended that pilots reduce airspeed and rate of descent or climb, with ATC authorization, and leave the danger zone on the ATC controller's instructions.


3024
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COMPETENCE OF AIRCRAFT MAINTENANCE ENGINEER DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 33-34

[Article, published under the heading "The Reader Continues the Discussion," by Lt Col V. Paliy, fighter regiment deputy commander for aviation engineer service: "Competence of the Engineer"]

[Text] The incident occurred during a flight operations shift, when our pilots were flying difficult combat training sorties. Terse pilot radio communications were coming in to the tower one after the other. Suddenly a voice containing a note of alarm came from the flight operations officer's speaker: "This is 43! My short-range navigation system is not working."

Naturally the people on the ground did everything they could to assist the aircraft in landing at its home field.

After landing, the aircraft was towed to the ramp. The aircraft technician, the flight technical maintenance unit chief, and avionics maintenance group specialists, led by Sr Lt V. Zamedyanskiy, clustered around the aircraft, unbuttoning inspection covers and disconnecting electrical connectors. Squadron deputy commander for aviation engineer service Capt V. Chervinskiy was also present.

I should like to talk about this officer and his role in such a situation, since the head of the squadron's aviation engineer service, in performance of any work on the aircraft under his care, is not only a technical expert but also, and primarily, the person responsible for its combat condition and its stable, uninterrupted operation in the air. It is important that he be a thoroughly knowledgeable, professionally competent specialist with a good understanding of aircraft equipment.

Let us return, however, to the incident under discussion. In short order the aviation engineer service specialists had inspected the aircraft and checked its equipment with testing instruments. They replaced several components from the short-range navigation electronics, and Senior Lieutenant Zamedyanskiy, together with servicing and maintenance group technician Sr Lt V. Antonyuk, reported to Captain Chervinskiy that the aircraft was ready to go.

The squadron deputy commander for aviation engineer service first scheduled a test flight to make sure that the problem had been corrected. The malfunction was again experienced, however, after which it became obvious that they would be unable to put the aircraft back on the line on schedule. But they were about to commence intensive flight operations, when they needed each and every aircraft to be operational.

Naturally the people in the squadron were concerned. It was necessary for regimental-echelon engineers to intervene. The picture which emerged was surprising to a great many people. "We did everything we could," reported Captain Chervinskiy. "Avionics specialists repeatedly checked all components and replaced some of them. Everything works normally on the ground, but in the air..."

"Did you check system operation while simulating flight conditions?" they asked the squadron deputy commander for aviation engineer service.

Captain Chervinskiy shook his head. But even without this it had become obvious that the aircraft had not been placed on blocks, and therefore that they had not performed simulation of establishing pressure in the hydraulic systems by retracting the landing gear. It was also ascertained that they had not artificially created air pressure in the pitot-static system.

Subsequently, when the aircraft technician and avionics specialists had performed all the prescribed operations and then retested operation of the short-range navigation system while turning the engine over, the cause of the malfunction was finally determined.

This incident in my opinion once again confirms the thought expressed in the article by Maj Gen Avn A. Grishin entitled "Squadron Engineer, What Should He Be?" (AVIATSIYA I KOSMONAVTIKA, No 11, 1984) that in present-day conditions the role of the squadron deputy commander for aviation engineer service as that person directly responsible for maintenance and repair of aircraft and maintaining them in a continuous state of combat readiness has increased to an immeasurable degree. I also agree with the author that one can observe in the activities of some unit specialization-area engineers a tendency toward excessively close supervision of the specialist personnel of their services, which weakens the influence of the immediate organizers of aviation engineer service -- the squadron deputy commanders for aviation engineer service. This is quite harmful.

In our unit things are different, and the incident as described above is a disturbing exception to the rule. In spite of the fact that Captain Chervinskiy, just as many others, is a comparatively young engineer, we endeavor to give him the opportunity at all times to resolve for himself the problems which arise in the process of equipment operation and maintenance. Of course not without oversight. From the day this officer arrived to assume enginer's duties, we closely watched his development.

Close attention to the problems which engineers encounter enables us leader-Communists to determine promptly and accurately who needs what help and to

specify further ways to improve the professional and methods skills of squadron deputy commanders for aviation engineer service.

We attach considerable importance to engineer analysis of equipment failures and malfunctions which sometimes arise. Using specific examples from practical maintenance activities, we teach engineers at the squadron echelon to think analytically and to approach from a scientific point of view any and all processes and phenomena which occur during operation of aircraft systems. Incidentally, the above-described case involving malfunctioning of the short-range navigation system was the subject of a detailed analysis by aviation engineer service officer-supervisors. Captain Chervinskiy was able to analyze thoroughly and in detail his mistakes connected with organization of work on the aircraft and at the same time to reassimilate a powerful behest of the times: the squadron engineer must have the ability to handle the components of his job-related activities in such a manner that they reliably support aircrew activities.

Incidentally, with time officer Chervinskiy has acquired the requisite skills, has developed the ability to have a sense of the new and advanced, to classify and systematize the best achievements in the process of servicing and maintenance of modern aircraft, and aggressively incorporates advanced know-how into practical work activities.

Current problems of aircraft maintenance, combat readiness, flight safety, and ways to increase the job proficiency and psychological conditioning of aviation engineer service specialist personnel are frequently discussed at monthly technical analysis sessions employing objective performance monitoring materials. These materials have become an effective means of officer and warrant officer instruction and of developing in these personnel organizer abilities, initiative, and development of a high level of technical knowledgeability. Reports are presented at these analysis sessions as a rule by the regimental engineers for areas of specialization or the squadron deputy commanders for aviation engineer service. They do not attempt to encompass a broad range of items for discussion and analysis. Only those items which apply in equal measure to all aviation engineer service personnel are analyzed.

Aviation specialist personnel are interested first and foremost in advanced know-how, and in particular in what has been achieved by the top subunits in the past month as regards equipment servicing and maintenance. For this reason advanced aircraft servicing and maintenance methods are frequently discussed at these sessions. The work experience of aircraft technician Sr Lt V. Volodkin, who during a tactical air exercise discovered a crack on a landing gear mudguard at a difficult-to-inspect location, was discussed in detail at an analysis session. This officer's precise, sure actions made it possible quickly to replace the part and promptly to release the aircraft for continued flight operations. The squadron engineer, speaking at the analysis session, also related in detail how senior aircraft mechanic WO S. Gorlov had discovered leakage in a hoseless connection in the system which changes the wing sweep angle.

At that same technical analysis session the squadron deputy commander for aviation engineer service discussed in detail methods of inspecting hard-to-get-at parts of the aircraft, used diagrams and models to show where primary attention should be focused, and related how to teach young personnel correctly to distribute their time in performing complicated operations on aircraft equipment.

In view of the fact that some officers do not yet have the ability to organize their labor in a genuinely scientific manner, we have begun to raise for discussion with great frequency items pertaining to the technical knowledgability of aviation specialist personnel and to remind people what components comprise it.

Every technical analysis session we hold includes a serious analysis of the state of job process and military discipline, and not at all because aviation personnel allegedly commit a great many breaches of regulations. Quite the contrary. Recently discipline has become appreciably better. But we raise these questions because we consider further strengthening of discipline to be an important reserve potential for increasing combat readiness.

The fact is that some aviation personnel have not yet become fully cognizant of the serious consequences which can result, for example, from reporting for duty late, failing promptly to report execution of a superior's instructions, violations of regulations pertaining to proper dress when working on an aircraft, etc. Matters pertaining to instilling discipline in personnel by squadron deputy commanders for aviation engineer service are also regularly discussed by us at meetings of the engineers and technicians section of the unit methods council.

The squadron engineer plays an important role in aircraft inspection. The deputy commander for aviation engineer service personnel inspects aircraft on equipment maintenance days and on days of immediate preparations for flight operations, following a schedule prepared in advance. The schedule is drawn up so as to ensure that the condition of all aircraft can be inspected within a specified period of time. These inspections definitely should differ from those conducted by the aircraft technician or flight technical maintenance unit chief. The engineer's job is much broader. Upon spotting a problem, he endeavors to prevent its potential occurrence on other aircraft.

I believe that it would be appropriate to note that success in this area depends in large measure on the engineer's level of technical competence, his analytical approach to each specific item and, to an even greater extent, on his scientific foresight.

In connection with this I recall the following incident, which happened some time ago. A certain squadron deputy commander for aviation engineer service discovered during preparation of an aircraft for live-fire ordnance delivery that the equipment was functioning flawlessly in self-contained mode but that when switched to automatic, the control and guidance system was giving problems. Thoroughly analyzing the symptoms of the problem and performing an additional check, the engineer, together with other specialist personnel, concluded that all aircraft subsystems were functioning properly. The

problems in operation of the automatic control and guidance had occurred due to uncoordinated actions by specialist personnel in manipulating controls in the fighter cockpit. This happened not only because certain technicians and mechanics lacked adequate skills in performing complex combined tests on the aircraft but also because the process of performing this critical operation had not been coordinated with the program of onboard systems automatic modes.

If one closely examines the problem, one readily notes that the specific features of readying modern aircraft require that organization of work activities and the sequence of operations are fully in conformity with those integral interlinkages which exist between subsystems, since even negligible malfunctions in one subsystem can affect the operation of others. Only that engineer who possesses the requisite aggregate of specialized knowledge will be able to achieve perfection in organizing servicing of modern aircraft and reduction to a minimum of even insignificant errors in readying aircraft through the fault of aviation engineer service specialist personnel.

Practical experience confirms that whenever an engineer does not restrict himself to the narrow framework of his job-related duties but, making use of specialized knowledge of education science and methodology, innovatively assists the military collective in maintaining a high level of combat readiness, aviation personnel display broader technical knowledgeability and mastery of modern aircraft equipment proceeds more rapidly and with smaller expenditure of manpower and resources.

Such an approach to things of course compels a squadron engineer constantly to work on self-improvement and to assimilate and analyze all new things brought into aviation by scientific and technological advance. It is precisely the engineer whose job it is to help pilots surmount the unique psychological obstacle in mastering onboard automatic control, electronic, and remote control systems. He should concern himself with ensuring that flight personnel thoroughly and comprehensively study the equipment they are operating and maintaining.



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EVOLUTION OF MiG JET FIGHTER DESIGN OUTLINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 35-36

[Article, published under the heading "Soviet Aircraft Designers," by Col V. Pavlov: "Swift Takeoff"]

[Text] Several years ago ranking officials from the Ministry of Aviation Industry, spokesmen for the Air Forces and the Moscow community, well-known aviation designers and test pilots attended a birthday celebration honoring outstanding Soviet aircraft designer twice Hero of the Socialist Labor Academician A. I. Mikoyan. Aviation Industry Minister I. Silayev, Chief Designer R. Belyakov, and highly-respected Air Forces experts spoke with warmth and sincerity about Artem Ivanovich. Photo display cases and boards had been set up in the large, sunlit room, displaying aircraft designed under the supervision of this gifted aircraft designer.

I recalled the airfield to which we frequently traveled for flight activities, and I recalled the fighters designed under the supervision of A. I. Mikoyan. They included the MiG-9, one of our first jet aircraft. In contrast to the aircraft developed at other design offices, this aircraft was powered by two turbojet engines producing a thrust of approximately 800 kg each. This was also the first fighter to employ twin jet engines. They were positioned in the fuselage side by side, with a common air intake.

Later, at the beginning of the 1950's our aviation regiment took delivery on an improved swept-wing fighter, the MiG-15. I recall how enthusiastic the men of my regiment were over this excellent aircraft. And how easy it was to maintain! Many pilots distinguished themselves time and again in performing complex missions, demonstrating a high degree of weapon and tactical proficiency at tactical air exercises and during demonstration flights. Our squadron's deputy commander, Gds Maj P. Shcherbo, who was several times awarded the Order of the Red Banner, as well as the Order of the Red Star, flew the MiG like a virtuoso violinist. Another veteran of the Great Patriotic War -- Pilot 1st Class Gds Lt Col I. Guts -- also proved to be a skilled combat pilot.

The MiG-15, simple both to fly and maintain, comparatively rapidly completed plant and government acceptance testing, and then was placed in service with

the Air Forces. It won the acknowledgement not only of Soviet pilots but also of aviators from the brother countries. The fighter demonstrated its "fighting character" in the period when the United States began armed intervention against China.

"In those critical days," notes the book "Istoriya vneshney politiki SSSR" [History of Foreign Policy of the USSR], "the Soviet Government, at the request of the government of the PRC, deployed several Soviet aviation divisions to China's northeastern provinces. Soviet pilots shot down dozens of U.S. aircraft in air-to-air combat...." Those divisions were equipped with the MiG-15. And the unexpected occurred: the U.S. B-29 "Superfortress," as the Americans called it, instantly lost its invulnerability. And journalists reporting in the Western press about the new Soviet fighter called it a "surprise."

MiGs proved to be a surprise not only for heavy bombers. British expert E. Smith described as follows the first air-to-air combat between U.S. P-80 Shooting Star fighters and MiG-15s in his book "Fighter Tactics and Strategy, 1914-1970." Believing to possess superiority, the U.S. pilots attacked the MiGs, intending to make short work of them. The latter withdrew and then, swiftly executing a turn, climbed and hit the Shooting Stars in a lightning-swift attack, immediately shooting down several of them.

The United States was forced to proceed on a priority basis with development of the F-86 Sabre, to put it into action against the fighter developed at the special design office of Artem Ivanovich Mikoyan. The Americans built the F-86 under close wraps of secrecy. The builders of the MiG and Sabre knew nothing about what the other side was doing.

Nothing tests military equipment, its survivability and reliability as actual combat. And the MiG-15 passed this tough test with honors. In the opinion of the majority of foreign aviation observers, this fighter was quite superior to the U.S. fighter. Its armament gave it absolute superiority: 3 cannon of great killing power. They fired 11 kg of lead per second, considerably exceeding the Sabre's fire capability.

It is not surprising that the Americans were making every effort to compensate for the weakness of their aircraft's armament. The magazine FLYING REVIEW, for example, calculated that a Sabre's six 12.7 mm machineguns had to expend 1,024 rounds to shoot down a MiG in air-to-air combat.

Foreign experts were also greatly impressed with the speed of the turnaround time in readying the MiG's weapons and the exceptional survivability of these aircraft. There were cases where aircraft returned to their home field with hundreds of bullet holes. Once a MiG landed with its controls almost totally useless.

One heavily-damaged aircraft was transported to the design office. Carefully inspecting it, Artem Ivanovich said: "It's not so bad to return home even in this condition after the entire capitalist world has been shooting at you!"

The chief designer was constantly concerned with improving the aircraft's survivability and personally accomplished a great deal in this regard. As soon as it became known that a MiG pilot was vulnerable to a round striking in a certain place on the aircraft, Mikoyan immediately set up a designer team and directed all efforts to correct the problem. The changes made in the seat and cockpit construction greatly increased the pilot's safety.

I recall those days when my colleagues and I would ready MiG armament for gunnery practice. And the weapons always functioned flawlessly. Our pilots effectively engaged ground and air targets with sureness and accuracy.

Superiority in vertical maneuver in combination with considerable firepower, enviable survivability and simplicity of operation and maintenance gave this aircraft an outstanding reputation. Once eminent Soviet aircraft designer A. Tupolev, strict and severe in his judgments, firmly stated: "The MiG-15 was unquestionably the world's finest aircraft!"

The birth of the MiG-15 was quite unique. During that period what was involved was not merely an advance in aircraft design thinking but a qualitatively new and difficult scientific step. Persistent efforts were being made not only to build a new aircraft but also to develop a transsonic fighter. This would represent a rather major step forward in the evolution of world aviation. Also the political situation, due to its complexity, was urgently requiring solutions at that time. In conditions of "cold war" the actions of the Americans, who were making full use of their resources and capabilities, were impelling our designers to even more intense, selfless and dedicated work effort.

Artem Ivanovich always thought innovatively and realistically. He possessed the gift of foresight and had the ability to outstrip time. Today a high-speed combat aircraft is inconceivable without a pilot ejection system. Many are not aware, however that this mundane piece of equipment required a quarter of a century of intensive effort, enormous inventive ingenuity and risk. The risk was particularly great at the beginning of the journey, when the unknown stood like an enormous cliff which was difficult to scale.

Solution to the problem was preceded by development of an emergency cockpit canopy jettison system. Considerable experience in such experiments had been amassed, but nevertheless Mikoyan was troubled by the state of affairs. The problem of effective canopy separation at various speeds was not easy to solve. This was particularly worrisome, since design of the MiG-15 jet fighter was proceeding in full swing at the special design office. The great increase in speeds required reliable canopy jettison, for otherwise ejection could be highly dangerous to the pilot. Therefore Artem Ivanovich was searching for the correct solution with his characteristic persistence. He was constantly inquiring about how things were proceeding and regularly studied reports on conducted experiments.

There were problems. At first the ejection seat refused to behave, and would tumble, causing many problems to the scientists, designers, engineers, and aviation medicine people. They were ejecting the seat from a Pe-2 bomber, designed by V. Petlyakov. Its twin tail reduced risk to a minimum and ensured

safety for the pilot ejecting in case of emergency. Finally the time came to perfect pilot ejection.

The day dawned clear on 24 July 1947. It was unusually quiet over the airfield: all flight operations were suspended. A single aircraft stood on one of the runways. A crane vehicle drove up to it, plucked up the ejection seat containing test pilot G. Kondrashov, and placed it in the cockpit of the Pe-2. Everything on the ground was ready to come to the test pilot's aid in case of emergency: an ambulance aircraft, specialized trucks, and a motorboat was patrolling the river. But the rescue equipment was not needed -- the ejection was a success.

Thus A. Mikoyan's design office successfully developed both swept wings and a new pilot ejection system for the new aircraft. Now it was the engine's turn. This was a fine gift to our country from the plant workforce on the eve of the 30th anniversary of the Great October Revolution.

In the mid-1950's our regiment transitioned over to the modified MiG-17 fighter. In this aircraft test pilot I. Ivashchenko had for the first time in history exceeded the speed of sound in level flight. Artem Ivanovich, however, did not take long breathers. He confidently led his team toward new jet-age accomplishments. After the MiG-17 went into regular production, the design office immediately proceeded with designing a fighter capable of flying at supersonic speed.

The advance to qualitatively new conditions of flight required of the aircraft designers innovative boldness, considerable follow-through, and thorough scientific research and experiments. The next fighter was given the designation MiG-19. It became the Soviet Union's first supersonic fighter.

Everybody realized that the development of jet aircraft, increasing speeds, the sound barrier and its successful crossing had enhanced the role and significance of test pilot labor. Artem Ivanovich maintained solid working contacts and friendly relations with pilot-engineers A. Grinchik, M. Gallay, K. Kokkinaki, G. Sedov, A. Fedotov, Yu. Shiyanov, and other renowned test pilots. This helped them a great deal in their difficult engineering labor. Soon pilot V. Vasin reached a speed of Mach 1.4 -- approximately 1,500 km/h -- in the MiG-19.

The day of government acceptance tests on the MiG-19 was approaching. At this time a problem appeared: when performing vigorous maneuvers at supersonic speed, under certain conditions the aircraft would, without any apparent reason, refuse to obey the ailerons, would enter a spin, and would refuse to respond to the controls.

In the fall of 1962, having completed investigation of the spin and all work on the power assist, they resumed scheduled testing of the aircraft. Displaying the greatest composure and a high degree of flying skill, G. Sedov, the design office's top test pilot, would on some days make 3 or 4 flights. During this period the team was faced with many difficulties to surmount. Finally the process of perfecting the new aircraft was completed. The design office also did a great deal of work on the pressurized cockpit, development

and adoption of a full pressure suit, and subsequently a high-altitude partial-pressure suit as well. Today we are seeing convincing proof of the fact that if these difficult problems had not been resolved back in those years, it is hardly likely that we could have achieved those speeds and altitudes which can be attained by the pilots of the 1980's....

Artem Ivanovich worked with purpose, with an eye to the future, and concealed nothing from his colleagues working at other design offices. Everybody who collaborated with Mikoyan's "company" stresses the feeling for the new which characterized Artem Ivanovich. He possessed boldness and an iron grasp in solving new scientific and technical problems.

Destiny brought Mikoyan together with Mikhail Iosifovich Gurevich back in the prewar years. Subsequently they worked together for many years, developing first-rate aircraft for our Air Forces. Artem Mikoyan and Mikhail Gurevich were always distinguished by the ability to select from a great many variations that one which was the best, the most interesting, which conformed to the spirit of the time.

The MiG-19 was followed by other new fighters designed under the supervision of Artem Ivanovich: the MiG-21, the MiG-23.... In 1970 I was present when the pilots of one of the aviation units took the first solo flights in the new fighter developed at Mikoyan's design office.

"You could fly Mach 3 with this baby," one of the pilots significantly commented about this aircraft.

The excellent results achieved by our intrepid pilots in MiG aircraft attest to the great intensity of creative search, purposefulness and ability of the people at the design office successfully to solve highly complex scientific and technical problems connected with the birth of modern fighters. In a comparatively short period of time three world records were set with regular production aircraft designed at this experimental design office.

This year Artem Ivanovich would have marked his 80th birtday. Fifteen years ago, in December 1970, life ended right in the creative prime for this outstanding individual and gifted aircraft designer, who had accomplished so much toward the development of Soviet military jet aviation.

Today, at the threshold of the 27th CPSU Congress, the design office team, under the direction of twice Hero of Socialist Labor Academician R. Belyakov, continuing the finest traditions of Soviet aviation design thought, is ably working on accomplishing difficult and important tasks, marching in the vanguard of scientific and technological advance.



3024
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ROUND-TABLE DISCUSSION OF INFLUENCE OF HOME LIFE ON JOB PERFORMANCE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 38-39

[Article, published under the heading "The Family and Work in Aviation": "We Are With You in Your Difficult Work...."; a round-table discussion]

[Text] An article by Viktor and Svetlana Bykov entitled "We Have Common Concerns" (AVIATSIYA I KOSMONAVTIKA, No 5, 1984), dealing with the conflicts between family and professional flying, sparked the interest of many readers. In their letters they share their own experience, tell of multifaceted work with the families of aviators, work which requires particular tact and sensitivity, and offer advice to young people. After going through these letters, the editors asked Lt Col B. Pirozhkov (Turkestan Military District), district air forces political section inspector; Lt Col V. Tsotsorin (Baltic Fleet air forces), regimental deputy commander for political affairs; Maj A. Malakhov (Central Group of Forces), squadron commander in a helicopter regiment; Maj A. Pisarenko (Group of Soviet Forces in Germany), squadron deputy commander for political affairs of a fighter regiment; and Maj G. Koshelenko, assistant political section chief for Komsomol work, to share their experience in indoctrination work.

[Question] In articles on the subject "The Family and Work in Aviation," the authors have a great deal to say about the interrelationship between the organization and structure of the family and the military service of aviation personnel. Specifically in what is this manifested, in your opinion?

[Lt Col B. Pirozhkov] There is a saying which contains a good deal of truth: when there is harmony in the family, any job goes smoothly. But what if there is disharmony in the family? Then sooner or later this will definitely have a negative effect on one's job, for an aviator's work is greatly influenced by the microclimate of the aviator's family and its moral atmosphere. What is the reason for this? Most probably the specific features of flying-associated work, of flight operations support activities and flight safety. This involves the highest degree of personal responsibility on the part of each individual involved in flight operations. If the members of the family of the

pilot, engineer, technician, and other specialist personnel are aware of this and are willing to share responsibility with him, all difficulties are easier to bear. Perhaps it is this reason why we in the political section receive almost no complaints or requests for the transfer of spouses to a new duty assignment. I must state frankly that the natural environment puts our people to the test. Hot desert sands, water hauled in, not a tree to be seen for kilometers on end.... But our fine women greet their husbands with a smile, raise children, and themselves work. They deserve a big vote of thanks for this!

[Lt Col V. Tsotsorin] But sometimes things are diffirent. A copilot senior lieutenant by the name of Ivanov served in one of our subunits. He was quite a proficient pilot. But he started having problems at home. He began seeking comfort in the bottle. As a result he was grounded and removed from his job. But this did not take place all at once. His colleagues and neighbors saw changes in this officer's behavior. His older, more experienced comrades should have helped the young people solve their problem, for it is very important to extend one's hand in a timely manner and to prevent a conflict from escalating into a truly calamitous situation. But in this instance help was late in coming, although a great deal was done for Ivanov. Perhaps if he reads these lines he will understand that all is not lost. He is not permanently banished from the skies. He must merely overcome his weakness.

[Maj A. Malakhov] I would like to draw your attention to the problem of the interrelationship of the moral-psychological climate in the family and in the military collective. Take, for example, a helicopter crew. Although we try to leave our personal affairs behind when we go to work at the airfield, if there has been a quarrel at home, you return to it in your thoughts again and again while you are out on a training sortie! The consequence of this is distracted attention and dulled vigilance. This results in a lack of understanding among crew members, irritation, nervousness, and even a witty remark is unable to relieve the tense situation. It is even worse when an aircraft commander arrives at the field for flight operations in a bad mood. His subordinates will immediately notice an unhappy expression or disinterested tone. And frequently a simple request that an order be clarified will cause an irritated individual to raise his voice. In such a situation can one expect smooth performance and good combat training results? I think not.

[Maj A. Pisarenko] In my opinion a family's influence on an aviator's job performance is determined in large measure by what is placed higher: the interests of the service or, let us say, material comfort and prosperity. If the former, respect and mutual understanding prevail in the home, the ability to give up immediate advantage for the sake of the cause an officer serves. But if it is the latter, selfishness is manifested, germs of crass materialism disturb the moral atmosphere, a wife wants to see her husband climb up the career ladder more rapidly, resentment develops, and envy of those who do a better job of mastering new aircraft. Particularly dangerous are haughtiness, conceit, and constant suggesting to one's husband that he "has been unjustly ignored" and "unfairly wronged."

[Maj G. Koshelenko] I shall continue this thought. If unhealthy ambition is gradually built up in an officer in the home, in the final analysis both he and his family suffer. But something else is harmful as well: when a pilot, engineer, or technician finds no support at home for his desire to broaden his knowledge and master new equipment. This frequently is connected with the need to leave an urban garrison and an apartment in the city. I have met military personnel for whom that same "bird in the hand" prevented them from reaching heights of expertise and from advancing beyond the narrow little world of bourgeois contentment. Their comrades have long since advanced up the career ladder, graduating from service academies, while they are still marking time. It is even more of a pity when this happens to promising officers who are unable to overcome the temptation to "have the good life" as soon as possible. An apartment stuffed with crystal and expensive rugs never has been and never will be a guarantee of family well-being.

[Question] The world of family relationships is complex. Their influence on an aviator's job is equally complex. Unfortunately it is not always beneficial. The editors receive many letters in which people suggest that we discuss relations within the family: why good relations exist in some families, while others end in a blowup. Our next question to participants in the round-table discussion relates to this: what do you consider to be the main thing in family relationships? Name a family which in your opinion can serve as a model.

[Lt Col B. Pirozhkov] I consider complete mutual understanding to be the main thing in relations with one's wife and children. It is no simple matter to understand another person, to take his pain onto oneself, to be together both in joy and in sorrow. The first days of married life seem to be a vacation which will never end. But our lives are woven to a greater extent of routine working days: busy, filled with work. Whether or not that former holiday atmosphere remains in a home depends on your ability to understand a loved one without long explanations, to lend a shoulder at a difficult moment. It is sometimes useful to look back and ask yourself: am I living the right way, am I doing the right thing, are my loved ones happy? Throughout my life, after being married as well, I have measured my performance against that of my parents. They had a difficult life. They experienced the bitter tea of war. But nevertheless there was more happiness than sorrow. My father and mother showed concern for one another. And everything seemed natural, because this was an integral component of their life.

[Lt Col V. Tsotsorin] In my opinion there is neither love nor happiness in a family without mutual respect, except for that which is presented as a deliberate show. But when you are alone you do not hide hostility or injured feelings. Come to think of it, I feel that an example of consideration should be displayed first and foremost by the man, and not only in words but by his entire behavior, by not keeping aloof from mundane household matters and by not shunning family concerns. And one more thing: the ability to control one's emotions is important. A certain officer might maintain his composure in the most difficult situation, but at home he might explode from the merest trifle. They reason approximately as follows. At work one is under the strict, uncompromising scrutiny of one's superiors, and there is the opinion of one's comrades as well as the influence of the military community to

consider. At home only your family are aware of your irritability. They will endure it and not air dirty linen. But does this do honor to anybody? My parents serve as a model for my wife and me. They also lived at various military posts. And they always showed love and consideration toward one another. They always have experienced and continue to experience joy at that first meeting, when they realized that they wanted to be together.

[Maj A. Malakhov] In my opinion trust is the foundation of family relationships. As long as there is trust, there will be both mutual understanding and respect. On the other hand, if suspiciousness becomes the established standard, in time it will undermine the foundations of family life. I consider the family of my former commanding officer, Colonel Koshelev, to be a model military family. Courtesy, extraordinary modesty, and the ability to come to one's assistance in a tactful and unobtrusive manner -- these traits distinguished Anatoliy Aleksandrovich and his wife. They were older than us, with considerable life experience. But they were always to be seen among young people. They had time for everything. There seemed to exist an invisible field of attraction around the Koshelevs. The young people in the regiment felt drawn toward them.

[Maj A. Pisarenko] I consider love to be the most important thing. A true, genuine feeling which does not disappear with the passing years. Then there are no mutual accusations or hurt feelings, from which conflicts begin. Each member of the family has his own duties. If you can help, help, but do not act like you are doing somebody a big favor. This only causes hurt feelings. Some people are always at the center of attention, no matter where they might be. The Yermakovs are such people. Aleksey is a flight commander, actively involved in volunteer work. Lyudmila is a musician. The children are very grateful to her for get-togethers with pleasant songs and fun holidays! And she does all this on a volunteer basis. And yet she has her own children at home. And the Yermakovs live happily and joyfully.

[Maj G. Koshelenko] I once read in a book that sincerity should be valued equally with courage. To be sincere means to be oneself at all times, in any situation, without exaggerating one's own merits and without embellishing things. Is this easy? Is everybody up to this? Within the family as well, relations should be above all else sincere. This makes it easier to surmount difficulties. My parents were always a model for me. I try to live and work as they did. But I was recently thinking: will we be just such an example to our children? In the course of our busy lives we would do well to give more frequent thought to this. In front of others one can pretend, being polite and courteous to one's wife. Children, however, do not buy phony behavior. They recognize it immediately for what it is.

[Question] The family is the primary unit of society. By strengthening the family we are at the same time strengthening our society. We have the following question for the participants in our round-table discussion: What is being done in your unit to strengthen families and to increase their influence on improving the quality of aviator job performance?

[Lt Col B. Pirozhkov] I can state with assurance that there has been established in many of our district's Air Forces units a definite system of

efforts by commanders, political agencies, and party organizations to strengthen families and to create in them a healthy moral-ethical atmosphere which positively influences performance of military duty. Commanders and political agencies guide the work of the women's councils and work together with them organizing meetings of wives of officers and warrant officers, specific-topic evening activities, recreation evenings, and talks by medical personnel, lawyers, teachers, scientists, and people active in the cultural domain. In recent years there has also been an appreciable rise in the level of individual work, especially in young and so-called materially less well-off families. When you travel around on business you become more and more convinced that wherever work with families and concern for the wives of officers and warrant officers and for children are not considered a secondary matter, combat training results are better and there are no negative phenomena in the community life. This is the way things are in the district's Air Forces units and subunits in which party members Belyayev, Baybikov, Yaremchuk, Pepelnitsyn, Chuprina, Budyak, Romanets, Shvedov, Ivanyuk, Sirotkin, and others serve. Of course a great deal remains to be done, and not everywhere is the situation satisfactory. What problems remain unsolved? Quite a few. For example, we need to improve the quality of communication. Do our service schools offer even a small lecture course on this subject? Or take the campaign against the ugly phenomenon of drunkenness. The party and government are taking resolute measures to put things in order. Locally one more and more frequently encounters appeals and slogans, but little effective preventive work is being done.

[Lt Col V. Tsotsorin] The fact is that work with the members of the families of military personnel is not at all an easy matter. First of all, it is necessary to be aware of the actual state of affairs. Leader personnel visit the families of officers and warrant officers. Such get-togethers in the home environment open up people as never before. You think you know a subordinate fairly well, but you have a talk with him, discuss a certain problem in detail, and you begin to understand him better, and you make a sound decision, which does not subsequently cause hurt feelings or misguided adverse opinion. And here is something else. You have to work with families in a strictly differentiated manner. And the environment or circumstances in which a talk is conducted is of considerable importance. Therefore in certain cases a talk should be conducted in the home, while in other instances it is better to talk in a more formal environment. A commander must also know when he should not go beyond mere discussion, when he should bring in the community, and when strict measures should be taken.

[Maj A. Malakhov] Of course our range of problems is somewhat narrower than at the regimental echelon. For this reason we have greater opportunity to perform individual indoctrination work with officers and their families. The commanding officer plays a special role here. If he himself does not take an active part in this work but considers it the business of his deputy commander for political affairs, you can be certain that the flight commanders will avoid it. We involve officers' wives in measures which are carried our in the unit and garrison. For example, we honor socialist competition vanguard performers with a festive ceremony. It is pleasant for women whose husbands have achieved top performance results to hear words of thanks and acknowledgement directed toward them. We also direct considerable attention

toward the internationalist indoctrination of the members of the families of military personnel, and we study the customs of the brother Czechoslovak people, their history and culture. A great deal is also being done to promote heroism-patriotism indoctrination. This was fostered by preparations for celebrating the 40th anniversary of the Great Victory. Nor do we ignore matters pertaining to improving living conditions.

[Maj A. Pisarenko] The following occurred after a tactical air exercise. We had successfully accomplished all assigned missions. A ceremony was being held at the airfield: the unit colors were proudly waving in the breeze, and the men were lined up standing at attention. Garrison wives and children were also present, gathered near the formation. This ceremony made an indelible impression on those present. We have a fine tradition -- all new men reporting for duty to the unit are given a briefing on its combat history. The commanding officer tells them about the unit's current activities, its top personnel, and names the activists on the women's council, those who skillfully combine homemaking and the upbringing of their children with conscientious volunteer civic work. We also try to hold women's meetings at our training facilities. At these facilities they see how their husbands are mastering the equipment and become imbued with that responsibility which rests on their shoulders. Interesting work is also being done jointly with GDR women's organizations. Our wives like very much the "Hostess" evenings at the garrison officers' club. We hold a memorable and festive newborn baby registration ceremony. All this creates that atmosphere of kindness which helps pilots, engineers, and technicians in performance of their job, helping them perform their patriotic and internationalist duty in an honorable and forthright manner.

[Maj G. Koshelenko] Komsomol organizations should more actively assist the commanding officer and party organizations in efforts to strengthen families and their influence on aviator personnel job performance. And we are devoting increasing attention to young married couples. Many Komsomol organizations are doing good work in this area, such as the Komsomol organization in the unit in which Captain Koydan serves as assistant political section chief for Komsomol work. Working together with the women's council, Komsomol activists organized "Globe," a club for young married couples. Its program of activities is filled with various measures which encompass the interests of young people. We also have young housewive's councils, lectures on international topics, debates, and special evening activities. There is another important area which should not be ignored -- work with bachelors. Work should be done to prepare them for forthcoming family life, and they should be drawn into volunteer community activities, actively utilizing various forms of ideological indoctrination work. An important role here should be played by Komsomol committees of service schools, Komsomol organizations of subunits and units, as well as other public organizations. This can only help our common cause.

[Question] That winds up our round-table discussion. This also concludes discussion of the article by Viktor and Svetlana Bykov. But this journal will

continue to devote due attention to the problem of mutual influence between the family and the job performance of aviation personnel. The editors would like to thank all contributors and readers who took active part in this important, necessary discussion.



3024
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U.S. RECONNAISSANCE, COMBAT COMMAND AND CONTROL SATELLITES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 42-43

[Article, published under the heading "The Pentagon's Orbital Arsenal," by AVIATSIYA I KOSMONAVTIKA special correspondent Candidate of Technical Sciences Col V. Gorkov: "Reconnaissance, Combat Command and Control Hardware"; based on materials published in the foreign press]

> [Text] At a recent reader conference at the Kubinka Air Forces garrison, the request was made that this journal discuss existing and under-development military space programs abroad. AVIATSIYA I KOSMONAVTIKA special correspondent Candidate of Technical Sciences Col V. Gorkov responds to our readers' request.

The aggressive intentions of U.S. imperialism have long since gone beyond the boundaries of any one agency. Today it utilizes every possible external political channel to attain its goals: from travel by tourists and talks between diplomats in Geneva, Vienna, Stockholm, to outright military intervention in the affairs of other countries. In every case its actions hide behind hypocritical expatiations about national security.

U.S. imperialism also hides behind this phony slogan in the matter of utilization of space hardware. Behind the verbal cloak of the 7 July 1982 directive entitled "U.S. National Policy for the Coming Decade in the Area of Space Exploration," the White House advances as a primary task that of strengthening military power by deploying space systems. Our readers have learned of its objectives from articles contained in issues Nos 6-10 of this journal. They clearly attest not to Washington's defensive but rather to its aggressive intentions. We should note that the Pentagon combines plans to create offensive space weaponry with improvement of military satellite systems tasked with supporting the operations of U.S. military forces, reconnaissance-intelligence gathering and combat command and control in particular.

The U.S. spaceborne reconnaissance and intelligence-gathering system was not established in one fell swoop. Working on individual types, Pentagon experts reached the conclusion that it was essential to construct a global system, in which one type of reconnaissance or intelligence collection would be

supplemented by another. It is believed that the United States first fielded such a system in the 1970's. It included imaging and electronic intelligence satellites, ICBM and submarine missile launch early warning satellites, as well as specialized spaceborne vehicles of the branches of service.

According to reports in the foreign press, the Pentagon arsenal currently contains imaging reconnaissance satellites of 3 types: high-detail, previously called SAMOS, Big Bird combined reconnaissance, and the new-generation KH-11.

SAMOS satellites are designed to take high-resolution photographs of ground installations. Their life span runs 50-80 days. The film is returned to earth in two canisters, which are released from the satellite and descend to earth into a preselected area.

Launching of Big Bird space vehicles commenced in 1971; these are used both for surveillance and high-detail reconnaissance. They contain two imaging systems. The first system transmits images to the ground by radio link, employing a six-meter diameter antenna which deploys in space. Exposed film from the other system is returned to earth at specified time intervals in one of four special canisters which separate from the satellite and are deorbited by onboard propulsion units.

Our readers ask: "What principle is employed in the radio-link transmission of photosurveillance images?" Two principles are employed. In the simplest satellite camera, as film is exposed it passes through a container with developer and fixing agent. The negative is then dried by a heater and wound onto a spool for subsequent electronic scanning. A narrow beam of light, traveling across the negative, "reads" information, while a signal generator produces signals corresponding to image intensity. These signals can be reconverted to an image at a ground information processing center. Such systems were developed at the dawn of photographic reconnaissance and proved quite effective when used in combination with photographs returned by canister. This so-called TV method is used on the Big Bird satellites.

The second principle is employed on the Landsat and KH-11 imaging reconnaissance vehicles. And although the former technically belong to NASA and the latter to CIA, there are no interorganization restrictions in exchange of information between U.S. intelligence agencies. Obtained data is channeled both to DOD and CIA. Positioned in the focal plane of these cameras is not film but an electro-optical device, the photosensitive portion of which consists of several thousand light-sensing elements several microns in size. Each picks up from the objective lens its own "ray" of light and converts it into an electrical charge. The obtained data are transmitted to a ground station in digital form, after which the image is reconstructed. This method makes it possible to distinguish objects even if they are camouflaged or have identical coloration. It is possible to distinguish, for example, a green-painted tank standing concealed in vegetation. As a result of photointerpretation processing, the tank appears dark-blue in contrast to the foliage, which will be red. Thus today satellites with digital data representation make it possible to obtain information which would never be obtained by traditional photointerpretation methods.

Resolution of images taken by the KH-11 satellite is inferior to that on film, but acquisition of information in digital form has certain advantages. Digital information is needed for any automated image processing (increasing contrast, correcting geometric distortions, conversion to a different cartographic projection). Images obtained on film must be converted to digital form for this purpose, and this leads to some worsening of resolution. With the present abundance of raw intelligence, automated processing capability is becoming increasingly more important.

It is believed that the aggregate of multispectral imaging, utilizing the visible and infrared regions of the spectrum, and computer techniques ensures the required effectiveness and will define the evolution of military photoreconnaissance up to the end of the 1980's.

In contrast to photoreconnaissance satellites, information on which is rarely published, some details have appeared in the press on the DSP missile launch early warning satellites. The satellite consists of an equipment bay and a Schmidt infrared telescope. Telescope length is 3.63 m, aperture 0.91 m, and its longitudinal axis is at an angle of 7.5 degrees to the longitudinal axis of the satellite. Two star sensors, charged-particle detectors, and antennas for communication with the ground are mounted at the point of junction of the equipment bay and telescope. The weight of the satellite in stationary orbit is approximately 1,150 kg.

Because the satellite rotates on its longitudinal axis, the same section of the earth reenters its field of view every 8-12 seconds. As a result it is possible to determine both the current position of a source of infrared radiation and its direction of movement. The obtained information is fairly crude, but it makes it possible to distinguish a moving object from a stationary one (a forest fire, for example). The threshold value of all 2,000 of the telescope's detectors can be adjusted to optimize detection. This helps distinguish a moving rocket even against a background of reflected solar radiation. The actual missile launch determination time is about 1 minute following launch.

Photoreconnaissance and electro-optical reconnaissance satellites employing the visible region of the spectrum are little-effective in darkness and bad weather. Pentagon experts seek to fill in this gap with imaging spaceborne reconnaissance vehicles carrying radar and infrared equipment. They place particular hopes on Landsat satellites carrying synthetic-aperture radar.

Their surveillance coverage zone from orbit is V-shaped, with maximum intensity of the radar beam at the center of the illuminated area, and with less-precise images along the margins. A synthetic-aperture radar eliminates this shortcoming. Its antenna, with an aperture analogous to a camera lens, is capable not only of receiving reflected signals but also of synthesizing them. As a result intensity equalizes, as it were, across the entire scan area, that is, one obtains an almost ideal radar.

The development of synthetic-aperture radar makes it possible to conduct radar surveillance at different angles, and thus to obtain a clearer image of the target object.

While imaging reconnaissance satellites are called the eyes of the Pentagon, electronic intelligence and radiointercept satellites are assigned another important mission -- to be its ears. For example, if a target lights up "like a lantern," saying "here I am," as it were, it is not difficult to detect. The function of "lantern" can be performed by a radar, for example. These satellites are designed not only to ferret out radio and radar transmitters. Theoretically they can be used to perform any mission assigned by the Pentagon pertaining to gathering intelligence on electromagnetic emissions, both in peacetime and in war. We shall discuss this below.

U.S. electronic intelligence-gathering and radiointercept satellites are operated by three agencies: the Air Force (Ferret), the Navy (NOSS and SSU), and CIA (Rhyolite). As is the case with imaging reconnaissance, exchange of information between organizations occurs here as well.

Ferret D high-detail radio and radar reconnaissance satellites, in operation since 1973, are tasked with obtaining intelligence on air defense systems, detecting redeployment of troops, weapon systems, and performing other missions. Judging by reports in the foreign press, the intelligence obtained from these satellites is used primarily in developing electronic warfare assets. NOSS and SSU satellites are employed to determine the nationality of foreign warships in the World Ocean. These vehicles are group-launched (one NOSS and three SSU satellites) atop an Atlas F booster into almost circular orbits at an altitude of approximately 1,100 kilometers and an inclination of 63.5 degrees. Performing the function of mother satellite in this "family," the NOSS processes information obtained from the SSU and transmits it to Earth. In addition to radio intercept, the instrumentation carried by these satellites can also obtain a radio bearing on target vessels.

A report was published in the foreign press in May 1979 stating that four satellites launched from Cape Canaveral in 1973, 1977, and 1978 into synchronous (inclination 10 degrees) and stationary orbits are used for electronic intelligence. They are tasked with intercepting rocket flight-test telemetry information. These satellites are designated Rhyolite. The first two are the principal vehicles. Their weight in orbit is approximately 275 kg. After they were launched, the launch complex for Atlas-Agena boosters at Cape Canaveral was dismantled, making additional launches impossible.

Current Pentagon thinking holds that the system will continue operating for several years in its present form, until commencement of launching of Aquacade satellites, with which the system is to be equipped in the future. They are to be placed into orbit by Titan 3D boosters and by the Space Shuttle.

Communications and combat command and control systems constitute the second echelon in the Pentagon's orbital arsenal. The Navy and Air Force were primarily involved in development of a satellite communications system. It is these services which provide a U.S. presence in "zones of vitally important U.S. interests." And as we know, these interests encompass various regions at various times, located thousands of kilometers from U.S. soil. Today 70 percent of long-range military communications is handled via satellite. This is why there is virtually continuous priority being given to projects

providing capability of rapid communications between early warning facilities, the National Command Authority, and nuclear forces command authorities. Shortwave communications equipment is being improved in the direction of increasing power and extending coverage. Laser communications systems and hardware are being developed, enabling satellite systems to make more extensive use of those frequency bands in which stable communications are possible in cases where the enemy creates jamming or when atmospheric disturbances occur as a result of employment of nuclear weapons.

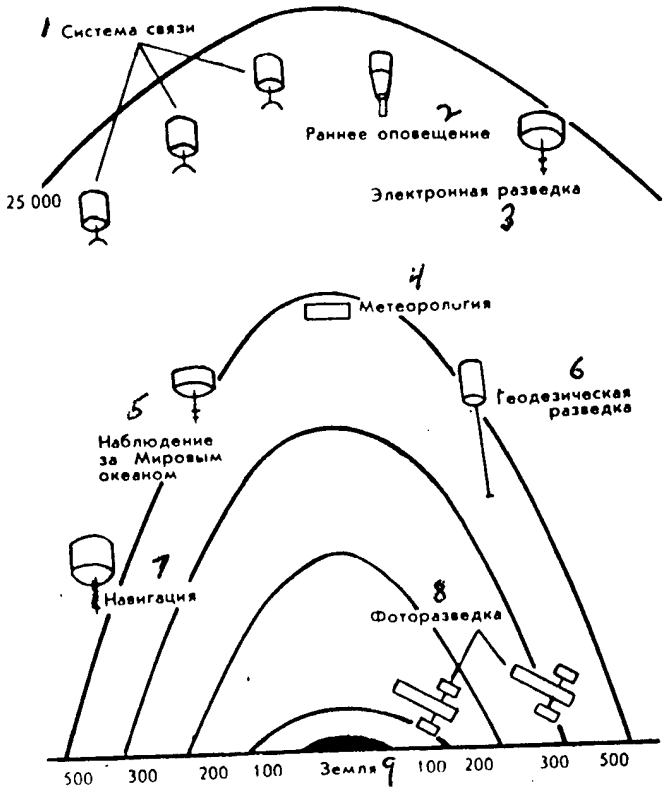


Diagram of reconnaissance and combat command and control orbital vehicles.

Key: 1. Communications system; 2. Early warning; 3. Electronic intelligence; 4. Weather; 5. Ocean surveillance; 6. Geodetic reconnaissance; 7. Navigation; 8. Photoreconnaissance; 9. Earth

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Military satellite communications systems are generally subdivided into three types. The first type is a wideband system serving the White House communications agency, the State Department (communications with embassies abroad), the Department of Defense, and the Air Force space command, control and telemetry system. Second and third-generation DSCS satellites are used in

this system. These satellites are deployed in stationary orbit over the Atlantic, Indian, and Pacific oceans.

The second type serves mobile (tactical) assets: warships, aircraft, and armored vehicles. The system uses FLEETSATCOM satellites, which are to be replaced by the new SYNCOM IV satellites, designed to provide tactical communications for such Pentagon operational components as rapid deployment forces, for example.

The third type is a communications system designed for operation in conditions of employment of nuclear weapons. The system employs 10-centimeter band equipment. It has been given the name designation AFSATCOM and uses relay equipment placed as additional payload on board some satellites developed in other programs. This system has 1,000 ground stations. It serves B-52 bombers, F-111 fighter-bombers, airborne command posts, TACAMO communications relay aircraft employed in communications with missile-armed submarines, Minuteman ICBM command posts, and nuclear weapons depots.

The SSS system is scheduled for development in the mid-1980's (second-generation AFSATCOM), employing special STRATSAT satellites in circular polar orbits at an altitude of approximately 200,000 kilometers. It is reported in the press that each STRATSAT satellite will provide 27 communication channels. Receivers and transmitters in the 10-centimeter, 1-centimeter, and millimeter bands are to be used. The number of SSS system ground stations is to be increased to several thousand.

The U.S. Armed Forces, particularly the Navy and Air Force, which stand guard over the imperialist policy implemented by the White House, have always needed a reliable navigation support system. Today the Transit satellites are a regular component of this system. In addition, the GPS global satellite navigation system is being developed. According to the Pentagon's plans, it will help boost the effectiveness of interventionist rapid deployment forces, and in the future will ensure quality of combat command and control of military forces in war.

Presently the GPS system is operating the first of 18 planned Navstar satellites. The system includes a main station, equipment for transmitting information to the satellites, and four monitoring devices. The main station for transmitting information to the satellites and one monitoring station are located at Vandenberg Air Force Base. The other three are in Alaska, Hawaii, and on the island of Guam. Within the operational system, plans call for establishing a main station as an element of the CSOC joint flight operations center in Colorado. Plans call for building two additional data transmission stations and one monitoring station.

The GPS system is scheduled to be at full operational readiness in 1987 to provide navigational position fixes for vehicles in movement, search and rescue operations, aerial photography, in-air rendezvous and refueling. It will help deliver weapons to the target.

These are the realities and the Pentagon's plans pertaining to development of orbital reconnaissance, combat command and control systems for coming years. And regardless of the arguments of U.S. politicians concerning improving satellite systems providing support services for the U.S. armed forces, it is quite obvious that all their calculations focus on a single goal -- preparations for war.



3024
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MEMORY OF MARSHAL VASILEVSKIY PRAISED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 44-45

[Article, published under the heading "Reminiscences of a Soviet Cosmonaut," by twice Hero of the Soviet Union Lt Gen Avn G. Beregovoy: "Unpretentiousness and Cordiality"]

[Text] I shall never forget the times I have met MSU Aleksandr Mikhaylovich Vasilevskiy, an outstanding individual. We were introduced by his son Yuriy, who was working at the time at the Cosmonaut Training Center. I first met him in September 1973. At the time Aleksandr Mikhaylovich was spending most of his time at a dacha near Arkhangelskoye, at his doctors' insistence. Another reason I remember that time is because our people were preparing to celebrate the 30th anniversary of the Battle of Stalingrad, where Marshal A. M. Vasilevskiy's field generalship talent was so vividly displayed.

I remember well our first meeting. Aleksandr Mikhaylovich was standing on the porch steps, smiling cordially, in a paternally kind manner. Shaking our hands, he invited us inside. He seated us in comfortable armchairs by his desk.

It somehow worked out that everything we talked about came down to a subject which was near and dear to our hearts -- aviation and the space program. Aleksandr Mikhaylovich talked at length about the pilots with whom he had come into contact by reason of his duties during the Great Patriotic War. He expressed his admiration for the talent of certain aviation commanders, whose field generalship abilities had contributed to the defeat of Fascist Germany and militarist Japan.

At the time the marshal was completing many years of work on his memoirs, in which, as he put it, he sought to relate as truthfully as possible about those people he had met, including aviators.

In mid-December 1942 Vasilevskiy was flying from Stalingrad to Buturlinovka in Voronezh Oblast, where front headquarters was located. It began to snow heavily, and the aircraft began to ice up. A safe conclusion to the flight depended on the pilot's presence of mind, courage, and professional skill. He did not let them down: he skillfully landed the aircraft on a snow-covered

field. Thirty years later, with the assistance of Air Forces Headquarters, the marshal succeeded in locating Sergey Kondratyevich Kovezin, pilot of that aircraft, and told about him in his memoirs.

Listening to comments about the combat performance of our pilots, filled with admiration at their heroism, courage, and skill, I involuntarily recalled the words of famous Russian writer Aleksandr Kuprin, spoken by him at the dawn of aviation, at the beginning of the 20th century: "Constant risk, a loved and dangerous job, constant exertion of attention, sensations of fearful height and depth and delicious ease of breathing, weightlessness of one's body and enormous speed, which most people will never experience -- all this seems to burn out, to drive out of the soul of the true pilot mundane baser feelings: envy, stinginess, cowardice, pettiness, irritability, boasting and lying -- leaving only pure gold." I said nothing aloud: any comment would have appeared immodest. But after several get-togethers and heart-to-heart conversations with the marshal I became convinced that the soul of Aleksandr Mikhaylovich was indeed "pure gold."

I was well aware of the great respect the marshal had for soldiers' combat exploits and that he had taken steps to ensure that soldiers who had distinguished themselves were promptly cited and decorated. He was unusually unpretentious, accessible, and distinguished by kindness and modesty. Once Aleksandr Mikhaylovich showed us his decorations, a mere listing of which would take up more than a page. It was a truly impressive sight: two Orders of Victory, two Hero of the Soviet Union Gold Stars, eight Orders of Lenin, an Order of Suvorov, 1st Class, an Order of the October Revolution, Order of the Red Banner, Order of the Red Star, and dozens of other decorations, including the highest decorations of the countries of the anti-Hitler coalition.

"These decorations," the marshal said, "are precious symbols which attest to the path I have trod in the ranks of our Soviet Army."

Once, after I had been made head of the Cosmonaut Training Center imeni Yu. A. Gagarin, a large parcel arrived in the mail. It contained a copy of the book "Delo vsey zhizni" [Lifelong Cause], bearing a priceless personal inscription: "Dear Georgiy Timofeyevich! Please accept this second edition of my book as a memento, with my very best wishes for the future in your life and career, and in your heroic labor. A. Vasilevskiy. August 1975." This remarkable book is filled with profound reflections on the sources of the invincibility of the Soviet Union, on the sources of the valor, courage, and military expertise of the defenders of the homeland, and is packed with vivid examples of the courage of Soviet soldiers, the marshal's companions in arms -- military leaders, field generals, commanders, and political workers. We utilize it extensively in indoctrination work with cosmonauts.

Particularly memorable was a get-together with Aleksandr Mikhaylovich on his 80th birthday. Work on the text of my congratulatory message on behalf of the people at the Cosmonaut Training Center convinced me of the cosmonauts' profound respect for this illustrious military commander and Communist.

"Esteemed Aleksandr Mikhaylovich!" our document read. "Administrators, the political section, cosmonauts, and all other personnel of the Order of Lenin

Cosmonaut Training Center imeni Yu. A. Gagarin offer their best wishes on this occasion of your 80th birthday." This was followed by a brief listing of the principal milestones in his heroic biography and enumeration of his great services to the Soviet people. "You are greeting your 80th birthday," the text concluded, "hard at work. Your writings arouse feelings of pride over the accomplishments and exploits of the older generations and arouse feelings of affection for the combat traditions of the Soviet Armed Forces, a readiness and willingness to defend the achievements of socialism."

I had the honor of presenting the text of the message of greeting to the guest of honor. When I handed the attractively-prepared folder to Aleksnadr Mikhaylovich, he took it, immediately opened it and proceeded carefully to read the text. It was apparent from his eyes that he was moved and pleased at the cosmonauts' solicitous attention. He immediately asked me to pass on to the collective his heartfelt thanks. He added that cosmonauts are members of one of the most courageous professions on earth.

Get-togethers and conversations with such crystal-pure individuals as was Aleksandr Mikhaylovich Vasilevskiy leave a mark. He was a member of the Leninist Party. The spiritual and moral value of characters such as that possessed by Marshal Vasilevskiy was determined by their profound patriotism, love for the homeland and people, by their revolutionary moral fiber, their political consciousness, their strong sense of citizenship, their readiness and willingness to give their life for the ideals of the revolution. Their lofty, purposeful existence grew and their Communist ethics and morality became enhanced in their selfless and dedicated labor for the benefit of their people.

There is a great deal that we pilots and cosmonauts can learn from this legacy. At the Cosmonaut Training Center we are endeavoring to pass on to youth, like a relay baton, all the moral and ethical values amassed by the generation of Soviet citizens to which MSU A. M. Vasilevskiy belonged. I am convinced that a good memory of him, and of his comrades in arms -- prominent military leaders of the Leninist school -- is of great indoctrinational significance not only for the present generation but also for future generations of builders and defenders of communism.



3024
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COSMONAUT TRAINING WEIGHTLESSNESS SIMULATORS, CENTRIFUGES DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) pp 45-46

[Article, published under the heading "Cosmonaut Training," by Candidates of Technical Sciences I. Pochkayev and V. Shuvalov and Engineer Yu. Bakulov: "Laboratories at Zvezdnyy"]

[Text] The article entitled "Simulators at Zvezdnyy" (AVIATSIYA I KOSMONAVTIKA, No 7, 1985) describes the principal facilities for training cosmonauts for manned space missions -- combined and specialized training simulators.

Devices simulating the factors of space flight (weightlessness, vacuum, G forces) and training simulators for cosmonauts to rehearse post-landing procedures form a special group of facilities for training cosmonauts, performing ergonomic tests of space hardware, and conducting scientific research. The purpose of training on these devices is to develop firm and stable skills in operating manned vehicles, utilizing onboard systems and individual protective gear (spacesuits) during the performance of installation, takedown, and repair operations during EVA activities, in conditions of weightlessness, vacuum or G forces in normal mission conditions and in case of occurrence of emergency and abnormal situations.

Specially-outfitted aircraft and weightlessness simulation tanks are used to reproduce weightlessness conditions, altitude chambers create the vacuum of space, and centrifuges produce G forces. Training methods are worked out in advance during ergonomic testing of spaceborne equipment or in the process of specialized experiments.

A team of specialists conducts these activities, the members of which include instructors, cosmonauts who have been on manned missions, engineers, technicians, and medical doctors. Before commencing a training session, following a mandatory medical examination, the team leader or instructor briefs the cosmonauts on what is to be accompilshed during the training session and on the workstation setup. The total number of training sessions for each type of training is determined based on the results of instrumentation monitoring of the acquisition of stable skills in performing

assigned tasks. Frame series taken by video recording equipment are used in analyzing the results of training sessions.

Crew member workstations are set up in the cabin of a flying-laboratory aircraft for training sessions in conditions of weightlessness: they are outfitted with tools, loads to be carried, means of securing ("anchors"), handrails, and gear necessary for practicing and rehearsing operations. The aircraft also contains backup power sources, life-support systems, and auxiliary recording equipment.

The aircraft follows a parabolic-trajectory flight path (zoom climb) in order to create conditions of weightlessness. At a certain moment the aircraft cabin reaches zero G, creating a brief period of weightlessness. From 10 to 15 weightlessness trajectories are flown during a session.

During these training sessions cosmonauts work on gaining skills in spatial orientation, while their system acquires the ability to take G loads alternating with weightlessness. They become familiarized with the peculiarities of movement and locomotion within a spacecraft or station compartment mock-up, and they practice assuming working positions, donning spacesuits, and using clamping and securing hardware. In addition they learn to carry loads while using handrails and standard securing hardware, and they perform various work operations (welding, assembling bolt and plug-socket connections).

The property of reduction of a spacesuit-wearing cosmonaut to neutral buoyancy is utilized in simulating weightlessness in the weightlessness simulation tank. Toward this end lead weights are attached to a pressure suit, which is almost identical to the standard spacesuit, in order to provide neutral buoyancy as well as balance or trim in relation to the center of mass of the entire "spacesuit-man" system. Those objects with which cosmonauts will be working in the weightlessness simulation tank are also adjusted to neutral buoyancy.

In addition to training cosmonauts, the weightlessness simulation tank is used to refine engineering design of space hardware under development, ergonomic tests are performed on space hardware, and engineers refine and detail the dimensions of hatches and tunnels, crew member stations, routes of movement and carrying of loads, spaceborn documentation is revised and adjusted, and cosmonaut training methods are developed.

The weightlessness simulation tank is a complex structure in which are concentrated mock-ups of a special version of space hardware, diving gear, instrumentation for recording and monitoring work activities in the tank, medical instrumentation, illumination devices, load-hoisting mechanisms, etc.

The weightlessness simulation tank is approximately 23 meters in diameter, 12 meters deep, and contains 5000 cubic meters of water. Mock-ups of space hardware, lighting and recording equipment, and that equipment with which the cosmonauts will be working are placed on a special load platform. After all equipment is mounted on the platform, the latter is lowered into the water. A total of 20 spotlights and 12 TV cameras are positioned in the 45 underwater

viewing ports, laid out in three tiers. Three TV cameras are mounted on a movable platform near the spacecraft mock-up. This equipment enables the person in charge of the training session to observe the actions of the cosmonauts or test personnel from various angles.

Emerging from the station EVA egress hatch, cosmonauts secure to a special device with detachable equipment (TV camera, scientific gear). When moving from one point to another they use safety tethers with carabiners or the lengthwise and annular handrails. Cosmonauts can place an additional "anchor" in the equipment bay area to make it easier to perform work in space lacking foot or handhold.

One of the tasks performed in the weightlessness simulation tank is synchronous execution of work activities being performed by cosmonauts in space. A TV image of the backup crew working in the tank makes it possible to evaluate the correctness of task performance by the cosmonauts in orbit and to compare work schedule performance. The method of simultaneous performance of orbital mission work tasks also makes it possible to simulate emergency situations arising in space and promptly to come up with recommendations on correcting them.

Activities in the weightless simulation tank require precise organization and discipline. Specialist personnel working in the tank, including cosmonauts, must be dive-qualified.

On recent missions cosmonauts V. Dzhanibekov and S. Savitskaya performed with precision all scheduled work experiments with general-purpose hand tools. Cosmonauts L. Kizim and V. Solovyev, after acquiring skills in the weightlessness simulation tank, logged six EVA work sessions, spending more than 20 hours outside the station, with each EVA being synchronously duplicated in the tank. Having commenced their EVA activities in the tank, cosmonauts V. Dzhanibekov and V. Savinykh successfully completed them by installing an additional solar panel on the Salyut 7 station.

Cosmonaut work procedures in a vacuum work environment are practiced in altitude chambers, using full-size mock-ups and modules of spacecraft, activating those systems involved in operation of emergency pressure suits, EVA spacesuits, life-support and airlock systems. Continuous two-way communications and medical monitoring are also performed.

Altitude chambers provide simulation of the dynamics of change in the gas composition of the atmosphere on board spacecraft and orbital stations, to practice and rehearse crew procedures in case of depressurization or fire, atmosphere change, as well as development and revision of spaceborne documentation and airlock procedures.

A full cycle of training and practice sessions consists of two stages. At the first stage cosmonauts become familiarized with the conditions of living and working in spacesuits and acquire skills in working with them "at altitude." The second stage includes training and practice sessions by the crew as a whole, practicing airlock procedures and working "at altitude." There are two centrifuges at the Cosmonaut Training Cwenter imeni Yu. A. Gagarin, with a 7

meter (TsF-7) and 18 meter (TsF-18) arm. Aircraft and space vehicles can be subjected to ergonomic tests on the centrifuges, in conditions prescribed by the appropriate documentation, with operator participation.

Spacecraft control procedures are practiced on dynamic training simulators. An operator work station, with controls and gauges, is set up in the centrifuge cab. A centrifuge control system is incorporated into the simulated spacecraft control loop. After entering input data into the computer and firing up the centrifuge and model, personnel proceed to practice the spacecraft deorbit burn procedure. A cosmonaut, positioned in the centrifuge cab, uses the controls to "land" the spacecraft, with prescribed conditions as regards G forces or other parameters. The control process is computer-recorded and displayed in graphic form for subsequent problem analysis.

The 18-meter centrifuge has a number of special features. It has two interchangeable cabs -- a single-seater and a two-seater. A prescribed atmosphere, by temperature, gas composition, and humidity, as well as a vacuum corresponding to an altitude of 40 kilometers, can be created in the single-seater cab. The cab contains X-ray equipment which operates during centrifuge rotation. Information on technical and medical parameters can be transmitted on 200 channels during rotation. The centrifuge is equipped with mannequins, which are used in testing equipment at G forces too great for humans to endure.

Doctors play an important role in the conduct of training sessions. They perform constant and continuous medical monitoring of the cosmonauts' condition and evaluate immediately, on a real-time basis, information which is recorded on storage media for subsequent processing.

Thus training activities on space environment and flight simulators, supplementing training on combined and specialized simulators, biomedical and flight training, enable cosmonauts to acquire the solid skills essential for flying manned missions.



3024
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STUDY OF EARTH'S MAGNETOSPHERE BOW SHOCK WAVE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 11, Nov 85 (signed to press 3 Oct 85) p 47

[Article, published under the heading "The Space Program Serving Science and the Economy," by V. Lyndin: "In the Vast Expanses of the Universe"]

[Text] Lifeless space, absolute vacuum, black silence.... Until recently this seemed to be a dogma which was not subject to doubt. But it was shaken by the very first space flights. Sensitive instruments transported beyond the limits of the atmosphere provided scientists with information which was inaccessible to the terrestrial observer.

The Sun, for example, continuously ejects fluxes of charged particles. Streaming outward into space, they form the so-called solar wind. When the sun is in a quiescent state, the velocity of the solar wind ranges from 300 to 750 km/s. It is constantly blowing past the earth as well as the other planets.

We live on the seabed of an ocean of air, safely shielded by a thick atmosphere and protected by a magnetic field. It is therefore not surprising that people thought that everything which takes place somewhere else in the universe has no relationship to them. The first person to entertain doubts on this score was Soviet scientist A. Chizhevskiy. In 1930 he analyzed the effect of factors of space on life on earth and established that space rhythms affect the processes which take place in living nature, at all levels of organization of biological systems -- from individual organisms to populations and communities. Terrestrial nature reacts sensitively to changes in solar activity. It determines reliability of radio communications, level of interference in power transmission lines and power generating facilities, the state of the weather, and people's subjective well-being. According to statistics, following the appearance of a solar flare, the number of cardiovascular ailments increases by a factor of 1.5-2. This is due to the sensitivity of the human organism to the low-frequency background which exists in the ground-adjacent layer of atmosphere. A solar flare causes it to increase sharply at frequencies of about 0.1 Hz. A healthy person can easily tolerate such fluctuations, but a sick person is highly sensitive to them. The number of auto accidents also increases during solar flares: an increase in the level of low-frequency field intensity slows people's reaction speed.

Thus study of solar activity and the mechanism of solar-terrestrial interlinkages not only helps broaden basic knowledge on the mechanisms of development of the universe but also pursues quite practical aims pertaining to our daily lives. These problems can be resolved only by carrying out a comprehensive program of observations in various earth and solar orbits. In the Soviet Union it is being conducted with the aid of Salyut manned orbital stations, Venera, Mars, Prognoz, and Kosmos unmanned vehicles, as well as Vertikal geophysical rockets.

Space research helped discover a strange phenomenon: when charged particles emitted by the Sun reach the Earth, a shock wave forms in the zone of impact with the Earth's magnetosphere.

The term shock wave has long been familiar in aviation. But only recently has it been used in the space research context. It is true that what is colliding in space is not a solid body with a flux of gas but what according to our terrestrial measuring stick is a vacuum with a vacuum, for a cubic meter of solar wind contains not more than 10 charged particles. For this reason such shock waves are called collisionless.

The bow shock caused by the solar wind in the vicinity of the Earth exists continuously. It is usually situated at a distance of 100-150 thousand kilometers from the day side of our planet. Research conducted with the aid of Soviet space vehicles has made it possible to classify shock waves and to obtain a general picture of their characteristics, frequencies of excited emissions in the plasma, and the accelerated particles. Experiments conducted in the past, however, were of insufficient temperal resolution and involved an incomplete extent of measured quantities.

The experiments were continued on 26 April 1985 with launching of the Prognoz 10 - Interkosmos unmanned scientific station, carrying new equipment for the investigation of the earth-adjacent and interplanetary shock waves, a component of the joint Soviet-Czechoslovak Intershock program. Taking part in the project together with scientists from the USSR Academy of Sciences Institute of Space Research and the Czechoslovak Academy of Sciences Astronomical Institute are specialists from the USSR Academy of Sciences Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation, the State Astronomical Institute imeni P. K. Shternberg, the Lvov Institute of Physics and Mechanics of the Ukrainian SSR Academy of Sciences, Charles University in Prague, and other scientific teams (a total of approximately 20 organizations). The decision was made to utilize for the program a high-apogee Prognoz satellite, the staandard orbital path of which intersects the Earth's bow shock front. With a four-day orbital period, the Prognoz travels to a distance of 200,000 kilometers from the Earth and passes for a fairly long period of time through undisturbed solar wind.

A characteristic feature of the scientific equipment which was designed and built for the Intershock program is its extraordinary high temporal resolution. It is 30-100 times that of previous experiments.

The Earth's bow shock wave is not entirely stationary. Solar wind fluctuations cause it to move, sometimes coming closer to the Earth, and other times moving further away from it. If we consider the fact that the wave proper is comparatively thin (only 100 kilometers), it is no easy matter to detect the moment of satellite passage. This task was assigned to an onboard computer. It continuously analyzes data being received from on-duty instruments. When the computer notes a burst or spike of physical parameters characteristic of shock wave passage, it switches the scientific instrumentation on to fast measurement mode and issues a command freezing internal memory. Data from measurements which were recorded in internal memory for a period of 50 seconds prior to this moment are written to nonvolatile storage medium. Thus the prehistory of the event is preserved. Intensive operation of all scientific instrumentation continues for 5 minutes. Measurement results are also written to nonvolatile storage, and subsequently transmitted to Earth.

A combined approach to conduct of the experiment, measurement of all requisite characteristics of the target processes, the memory and storage capabilities of the onboard aggregate of scientific instrumentation, flexibility in constructing measurement programs and, what is particularly important, the high temporal resolution of measurements, have made it possible for the first time to obtain data on the internal structure of the bow shock wave front and the mechanisms of its formation.

The Earth's and interplanetary bow shock waves model, as it were, the grandiose processes of interaction of plasma fluxes in the mysterious depths of space. In spite of a vast difference in energy, scientists believe that the plasma mechanisms of formation of shock waves in interplanetary space and in astrophysical objects are of one and the same nature, and consequently their investigations in the solar system can help us understand the processes which are taking place on the scale of the universe as a whole.



3024
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HONORING ROCKET FORCES AND ARTILLERY DAY

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[Article, published under the heading "In Honor of Rocket Forces and Artillery Day"]

[Text] There are many important dates in the biography of our glorious Armed Forces. These days include 19 November. On this date in 1942 a cannonade of 15,000 guns, mortars, and rocket launchers announced the beginning of the defeat of the powerful Hitlerite force at Stalingrad.

Soviet citizens will never forget the heroic deeds accomplished by artillerymen during the Great Patriotic War. They destroyed more than 70,000 tanks and assault guns, 167,000 guns and mortars, and killed large numbers of enemy personnel. More than 1,800 artillerymen were awarded the title Hero of the Soviet Union, and more than 1,600,000 men received decorations. Many artillery units and combined units were awarded the guards title and honorary name designations.

In the postwar years, thanks to constant attention and concern by the Communist Party and Soviet Government as well as the creative efforts of Soviet scientists, designers, engineers and workers, powerful modern weapons of all types and categories were developed, including rocket and missile weapons, boasting mobility, power, a high degree of maneuverability, rapid rate of fire, great range and effectiveness. Since 1964, as recognition of the important role played by rocket forces in strengthening the defense capability of the Soviet State and the entire socialist community, the date 19 November has been celebrated each year as the Rocket Forces and Artillery Day.

Advancing toward the 27th CPSU Congress, our missilemen and artillerymen, successors to glorious fighting traditions, are prepared at all times, together with the fighting men of the other branches of service and arms, to defend the peaceful, productive labor of the Soviet people.



3024
CSO: 9144/88

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